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COMBUSTION AND HEAT TRANSFER VOLUME 4: COMBUSTION DATA SETS



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TABLE OF CONTENTS

SECTION		<u>PAGE</u>
PREFACE		vi
1.0 INTRO	DUCTION	1
2.0 DESCR	RIPTION OF FACILITY & TEST CONDITIONS	
2.1	Well Stirred Reactor (WSR) Experiments	2
	2.1.1 Test Facility and Instrumentation	2
	2.1.2 Test Conditions	
	2.1.3 Error Analysis	2
2.2	Step Swirl Combustor (SSC) Experiments	3
	2.2.1 Test Facility and Instrumentation	
	2.2.2 Test Conditions	
	2.2.3 Error Analysis	4
2.3	Turbulent Swirling Flame Experiments	
	2.3.1 Test Facility and Instrumentation	
	2.3.2 Test Conditions	
	2.3.3 Error Analysis	6
3.0 LIST O	F RELEVANT PUBLICATIONS	9
APPENDIX	CSELECTED DATA SETS	
Α	Well Stirred Reactor (WSR) Studies	15
В	Step Swirl Combustor Studies	44
C	Turbulent Swirling Flame Studies	68

FIGURES

Figure 1.	Schematic of the Toroidal WSR (all dimensions in mm)	12
	WSR Test Facility and Associated Instrumentation	
Figure 3.	Schematic of a Step Swirl Combustor	14
	Schematic of a Swirling Jet Diffusion Flame Combustor	

TABLES

Table 1.	Well Stirred Reactor (WSR) Test Matrix	.7
Table 2.	Step Swirl Combustor (SSC) Test Conditions	.7
Table 3.	Experimental Test Conditions for Turbulent Swirling Jet Diffusion Flames	. 8

PREFACE

The University of Dayton Research Institute (UDRI), working under Air Force Contract No. F33615-92-C-2207 submitted this final report to the U.S. Air Force Wright Laboratory, Aero Propulsion and Power Directorate, Wright-Patterson AFB, OH. Mr. Charles Frayne of WL/POSC (now AFRL/PRSC) was the Contract Monitor and Dr. D. R. Ballal of the Aerospace Mechanics Division, UDRI was the Principal Investigator. This report covers work performed during the period June 8, 1992 through December 31, 1997.

The Principal Investigator wishes to express his gratitude and appreciation to Dr. W. M. Roquemore for his encouragement and support and to Ms. Linda Nianouris for her assistance in report preparation.

1.0 INTRODUCTION

A long-term goal of the Air Force is to develop high-performance gas turbine engines with combustors that operate at near-stoichiometric conditions, burn broad-specification fuels, and have low maintenance and high durability. Therefore, the objective of the proposed research was to develop a fundamental understanding of the combustion process in a gas turbine combustor by designing a variety of laboratory experiments. Specifically, we completed the following key investigations.

- 1. WSR experiments to study combustion stability, lean blowout (LBO), and emissions.
- 2. Flame stabilization and lean blowout studies using a step swirl combustor (SSC).
- 3. Study of turbulent swirling jet diffusion flame structure and stability.

In this final report, we present the Combustion Data Sets that may be used by modelers in the industry and other laboratories for evaluating and refining computer models of gas turbine combustor. Only a sample of these data sets is presented. An exhaustive amount of information is available in the individual papers and data set reports listed in the next section. All the data sets were prepared using Microsoft Office 97 Software for IBM PC-Compatible computers. These data sets are also available on computer floppy diskettes, CDs, and by accessing the World Wide Web (WWW).

These data sets were obtained in the Fundamental Combustion Laboratory located in Building 490, Test Cells 151,152, and 153 of the Fuels and Lubrication Division (WL/POSF). This test facility is equipped with a toroidal well stirred reactor (WSR), an SSC, and a swirling jet diffusion flame combustor. A brief description of the test facility and test conditions is given. Next, selected (and sample) data sets are presented on WSR experiments, SSC tests, and turbulent swirling flame measurements. An analysis, discussion, and interpretation of these data and results are presented in a separate "combustion studies" report.

2.0 DESCRIPTION OF TEST FACILITY

2.1 Well Stirred Reactor (WSR) Experiments

2.1.1 Test Facility and Instrumentation

Figure 1 shows a 250-ml toroidal WSR that was used for this experiment. This reactor was constructed of alumna cement, and featured a jet ring with 32 stainless steel jets, 1 mm I.D., to inject the fuel-air mixture at high subsonic velocity (Ma = 0.42 to 0.85). Figure 2 provides a schematic of the test facility and instrumentation.

The Horiba Emissions Analyzers comprised the following units: Model MPA-510 oxygen analyzer (0 to 50 volume percent), Model FIA-510 total hydrocarbon analyzer (0 to 10,000 ppm carbon), Model VIA-510 CO (0 to 20 volume percent) and CO_2 (0 to 100 volume percent) analyzer, and Model CLA-510 SS NO and NO_X analyzer (0 to 2000 ppmV). These units were calibrated with gases of the following concentrations: hydrocarbon = 404 ppmV propane, NO = 92 ppmV, $NO_2 = 1.6$ ppmV, CO = 0.4 volume percent, $O_2 = 4.03$ or 5.02 volume percent and $CO_2 = 11.06$ volume percent. Water was scrubbed from the sample gas to a maximum dew point of 5C. All emissions are quoted on dry standard air basis.

A gas sample was drawn from the WSR by a water-cooled stainless steel probe. Hydrocarbon speciation at LBO conditions was performed by collecting sample gas in a Tedlar bag and directly injecting sample into a gas chromatograph-flame ionization detector (GC-FID, Hewlett-Packard HP 5890 A). Combustion temperature, T_f, was measured by insertion of a Type B thermocouple (platinum-6% rhodium, platinum-30% rhodium) coated with alumna ceramic. Temperature measurements were corrected for heat loss by conduction and radiation to colder reactor walls, and heat gain by convection and catalysis. A vaporizer was built to prevaporize liquid fuels, mix the vaporized fuel with air, and then supply this combustible mixture to the WSR.

2.1.2 Test Conditions

Our test matrix is shown in Table 1. The WSR operated over the range of equivalence ratios $\phi = 0.43$ to 0.88, loading parameter (LP) ~ 1.3 g-mol/sec L atm^{1.75}, residence times $\tau \sim 5$ to 8 msec and reactor temperatures $T_f = 1350$ to 2000 K. Hydrocarbons tested were: methane, ethane, cyclohexane, n-heptane, n-dodecane, toluene, ethylbenzene and a gaseous mix of 15 percent methane, 25 percent ethane, 60 percent ethylene by volume (a cracked fuel simulant).

Emissions measurements were performed for all test conditions shown. A volumetric mix of 13 percent C_{14} , 22 percent $C_{2}H_{6}$, 52 percent $C_{2}H_{4}$, 13 percent $C_{7}H_{8}$ by volume, giving a carbon number, CN = 2.52 and carbon to hydrogen mole ratio, (C/H) = 0.5081 was selected as simulant for heavy, aromatic-containing fuels that are cracked using thermal or catalytic processes into light fractions with residual light aromatics. Additionally, several of the leanest conditions shown represented LBO, at which point bag sample emissions data were collected.

2.1.3 Error Analysis

Gaseous fuel flow was monitored to within ± 2 percent of reading using a Gilmont rotameter. Airflow was monitored to within ± 2 percent of full scale using a Brooks rotameter. The combined error produced an uncertainty of ± 3.5 percent in ϕ during combustion of methane in air. Nozzle air was monitored to within ± 2 percent of full scale using a Gilmont rotameter. Liquid hydrocarbons were controlled to within ± 0.3 g/min by the liquid fuel delivery system. The

combined error produced an uncertainty of ± 3.5 percent in ϕ during combustion of a liquid fuel in air. The T_f measurements using the calorimetric method were repeatable at a given ϕ from day-to-day within ± 30 K. Also, calibrated thermocouples agreed with the measurements using the calorimetric method within ± 30 K. The Horiba emissions analyzers have an accuracy within one percent of full scale. This represented an error of 2 ppmV NO_X, 50 ppmV CO, 10 ppmV carbon for UHC, 0.25 volume percent O_2 , and 0.5 volume percent O_2 . Residence time was typically controllable to within ± 0.6 msec. Additionally, CO measurements were repeatable from day to day within ± 100 ppmV, and NO_X within ± 1.5 ppmV. UHC measurements at very lean conditions suffered from poor repeatability due to variance in the LBO condition. This issue is discussed in detail later. Finally, the sampling system was capable of measuring approximately 90 percent of the CO concentration simulated to be the WSR product concentration at $\phi = 0.6$, $\tau = 7.0$ msec. This suggests that probe oxidation reactions are minimized by the water-cooled stainless steel probe design.

2.2 Step Swirl Combustor (SSC) Experiments

2.2.1 Test Facility and Instrumentation

Figure 3 shows a schematic diagram of SSC, which has a 150-x150-mm cross section, length of 754 mm, and a step height of 55 mm. Fuel is supplied to the combustor by the annular fuel tube (20 mm i.d. and 29 mm o.d.) coaxially sandwiched between swirling air streams; the inner air jet (20 mm dia.) and the outer annular air jet (29 mm i.d. and 40 mm o.d.). The combustor exit has a 45% blockage orifice plate on top that simulates the back pressure exerted by the dilution jets in a practical gas turbine combustor. The SSC has quartz windows on all four sides to permit visual observations and laser diagnostics measurements. Stationary helical vane swirlers were located 25 mm upstream from the burner tube exit in each of the air passages. The inner swirler had six vanes with a central 1.4 mm dia. hole to prevent the flame from anchoring to the swirler. The outer swirler had 12 vanes. Inner swirler lengths are 25, 19, and 19 mm, respectively, for 30°, 45°, and 60° swirlers; outer swirler lengths are 32, 25, and 19 mm, respectively, for 30°, 45°, and 60° swirlers. We used flow visualization, CARS system for temperature measurements, and the LDA system for velocity measurements. The CARS and LDA systems are described below.

CARS System: A Coherent Anti-Stokes Raman Spectroscopy (CARS) optics system was used for unintrusive flame temperature measurements. Briefly, the CARS signal was generated by combining two 30 mJ doubled Nd: Yag beams at 532nm and one 25 mJ broad band dye laser beam centered at 607nm and pumped by the same Nd: Yag laser. The pulse laser and detector camera run at 10 Hz. A Boxcars configuration with an ellipsoidal probe volume approximately 25µm (dia.) x 250µm (length) was used for collecting the signal. The detector is a Princeton Instruments intensified 576x384 charge coupled device (CCD). The intensifier is triggered by a Princeton PG-10 pulsar. A Princeton ST-130 controller operates the camera and the detector chiller. The collection process is controlled by Princeton's ST-130 CSMA software package running on a personal computer. Spectra are fit to a library of spectra by a nonlinear fitting routine running on a personal computer. A total of 250 samples was taken for each CARS temperature measurement. LDA System: Unintrusive velocity measurements were made using a Dantec Fiber-Flow LDA system. Essentially, the 2-D LDA system uses the 514nm and 488nm lines from an Argon-ion laser. The laser output is directed into a Dantec Fiber flow transmitter where the colors are

separated and directed to optical fiber couplers by a Bragg cell operating at 40 MHz. The four beams are guided to the probe via polarization preserving fibers. The recollimated and focused laser beams cross to produce an ellipsoidal probe volume approximately $100\mu m$ (dia.) x $1000\mu m$ (length). A fluidized-bed seeder was used to inject submicron-sized ($97\% < 1\mu m$) ZrO_2 particles into each burner tube passage. Velocity biasing was resolved by seeding one passage at a time. The forward scattered signal is collected and separated by diachronic mirrors before it is detected by photo multiplier tubes and processed by individual TSI burst counters. Typical coincident sampling rates exceeded 1 kHz in flames. A total of 2048 coincident samples were collected for each velocity measurement. Custom-designed software was used to reduce the data on a personal computer. Three-component noncoincident velocity measurements were made with the 2D LDA system by scanning in the transverse and radial directions to get axial and tangential velocities, and axial and radial velocities, respectively.

2.2.2 Test Conditions

Table 2 lists the experimental test conditions for the SSC. Since increasing the inner vane angle increases turbulent mixing and strengthens the inner recirculation zone; these changes dramatically affect the flame structure and the stability characteristics. Therefore, experiments were performed to reveal the differences in flame structure by changing the inner vane angle. Test conditions were also chosen to compare: (i) attached versus lifted flames and (ii) co versus counterswirl configurations.

Experimental measurements included flame photography, three-component mean and rms velocities, mean and rms temperatures, and LBO. The LBO data were collected by maintaining a constant airflow rate, heating the combustor to a near steady-state temperature at stoichiometric fuel-air ratio, and then gradually decreasing the fuel flow rate until blowout occurred.

2.2.3 Error Analysis

For obtaining flame temperature, usually, 500 samples were taken for each CARS measurement to ensure that the error in the rms temperature was less than 10 K, while 1500 samples were taken in the flame region where the rms values were expected to be large. Overall, we estimated the CARS mean temperature measurement accuracy to be within 50 K, while the precision was well within 20 K. Unlike the LDA, CARS temperature measurements are time-averaged, without the density biasing effects. We also discovered that once system parameters are optimized and the dye laser is tuned, the CARS system can run for long periods of time. For example, we obtained repeatability to within ± 20 K for a mean flame temperature of 1500 K after 4 days of operation.

In processing the LDA Doppler burst signal to obtain velocity measurements, typically a total of 2⁵ cycles/burst are requested and the spurious data are filtered by using the 3s test. The error in rms velocity was less than 3 percent and uncertainty in mean velocity was less than 1 percent at a 95 percent confidence limit. However, in recirculatory and reactive flows, the velocity statistical biasing was worst. We found that the mean values can be overestimated up to 7 percent and the rms values underestimated up to 5 percent for turbulence intensity levels above 20 percent. The flow rates calculated from integrating the velocity profiles were 3 percent or less than the measured flow rates. This difference is partly attributed to the plus-or-minus 1 percent measurement accuracy of the mass flow controller. To eliminate velocity biasing due to non-uniform seeding, a conditional data sampling technique was used by seeding particles into only the

fuel jet or the annular coflowing air. This type of technique allowed us to track the convection and diffusion of one (seeded) fluid into another (unseeded) fluid.

2.3 Turbulent Swirling Flame Experiments

2.3.1 Test Facility and Instrumentation

Figure 4 shows the schematic of a turbulent swirling jet diffusion flame combustor. This combustor consists of a central fuel tube (9.45-mm inner diameter, 0.2-mm lip thickness, 806-mm length) and a concentric annular-air tube (26.92-mm inner diameter), centered in a vertical test section (150 x 150-mm square cross section with rounded corners, 486-mm length), through which external air is supplied. The test section has four quartz windows for laser diagnostic measurements. A helical vane swirler unit is placed in the annulus channel 96 mm upstream from the jet exit. We used flow visualization, CARS system for temperature measurements and LDA system for velocity measurements. The CARS and LDA systems are described below.

CARS System: The CARS optics layout was used for temperature measurements. The laser source is provided by a Nd:Yag pulse laser with a 10-ns time resolution and a Boxcars configuration is used. The probe volume is approximately 25-μm by 250-μm. The CARS signal is collected by a Spex 1702 spectrometer, 2-D charge coupled diode (CCD) camera from Princeton instruments, and Tracor-Northern multi channel analyzer. A total of 250 samples were taken for each CARS temperature measurements. The raw data is processed by in-house software on a personal computer.

LDA System: A custom-made three-component LDA system was used for velocity measurements. This is a three-beam two component (axial and radial) set using a 514.5 nm line of an 18 W argon-ion laser with a component separation based on polarization. A two-beam third component (tangential) set uses a 488.0 nm line with separation by color. Since the third component is normal to the first and second components, the measurement volume had a quasispherical shape of 100 μm diameter and the calculated fringe spacing was 3.6 μm. The LDA system has Bragg cell frequency shifting (10 MHz for the first and second channels and 30 MHz for the third channel) for measurements in recirculatory flows, 4-σ filtering software for spurious signals, for example, due to seed agglomeration, and a correction subroutine to account for the LDA signal biasing effects in combusting flows. A fluidized-bed seeder was used to inject sub micron-sized (0.1 μm) ZrO₂ particles into each passage. Counter type (TSI 1990C) signal processors and tailor-made coincidence circuit ensured valid data rate acquisition. All the LDA signals were processed using our custom-designed software which calculates intensity, shear stresses, higher moments (skewness and kurtosis), and pdfs. Typical LDA sampling rates exceeded 1 kHz for both isothermal and combusting flow measurements.

2.3.2 Test Conditions

Table 3 shows the test conditions employed using gaseous hydrogen as the fuel. All tests were performed at room temperature and atmospheric pressure. The fuel jet, air jet, and the external coflowing stream velocities were up to 30 m/s, 10 m/s, and 0.5 m/s, respectively. The flame stability limits were measured as follows. For a fixed annular- and coflowing-airflow rates, the fuel flow rate was increased gradually until the flame attached to the burner-rim, lifted above the burner, or simply extinguished (blowoff). Now, at the lift condition, fuel flow was: (1) decreased

until the flame reattached to the burner-rim (dropback), or (2) increased until the lifted flame extinguished (blowout). A three-component LDA, CARS, and Mie scattering systems were used for a variety of conditioned and unconditioned measurements of mean and turbulent quantities. For a set of values of jet, annulus, and external velocity, measurements extending up to 34 jet diameters were made at a large number of radial locations up to X 3.2 jet diameters.

2.3.3 Error Analysis

LDA Precision and Accuracy: In processing the LDA Doppler burst signal, typically a total of 2⁵ cycles/burst are requested and the spurious data are filtered by using the 3s test. The error in rms velocity was less than 3 percent and uncertainty in mean velocity was less than 1 percent at a 95 percent confidence limit. However, in recirculatory and reactive flows, the velocity statistical biasing was worst. We found that the mean values can be overestimated up to 7 percent and the rms values underestimated up to 5 percent for turbulence intensity levels above 20 percent. The flow rates calculated from integrating the velocity profiles were 3 percent or less than the measured flow rates. This difference is partly attributed to the plus-or-minus 1 percent measurement accuracy of the mass flow controller. To eliminate velocity biasing due to non-uniform seeding, a conditional data sampling technique was used by seeding particles into only the fuel jet or the annular coflowing air. This type of technique allowed us to track the convection and diffusion of one (seeded) fluid into another (unseeded) fluid.

CARS Precision and Accuracy: Usually, 500 samples were taken for each CARS measurement to ensure that the error in the rms temperature was less than 10 K, while 1500 samples were taken in the flame region where the rms values were expected to be large. Overall, we estimated the CARS mean temperature measurement accuracy to be within 50 K, while the precision was well within 20 K. Unlike the LDA, CARS temperature measurements are time-averaged, without density biasing effects. We also discovered that once system parameters are optimized and the dye laser is tuned, the CARS system can run for long periods of time. For example, we obtained repeatability to within X 20 K for a mean flame temperature of 1500 K after four days of operation.

Table 1: Well Stirred Reactor (WSR) Test Matrix.

Hydrocarbon	Carbon Number	(C/H)	τ (msec)	ф _{тіп}	фтах	T _{f min} (K)	T _{f max} (K)
Methane	1	0.25	7.3	0.55	0.88	1507	1967
			6.32	0.59	0.83	1517	1918
Ethane	2	0.333	7.26	0.48	0.84	1407	1996
Cyclohexane	6	0.5	7.47	0.48	0.82	1429	1981
			5.22	0.51	0.78	1536	1922
n-Heptane	7	0.4375	7.19	0.53	0.84	1517	1975
			5.49	0.54	0.81	1595	1974
Toluene	7	0.875	7.32	0.46	0.79	1499	1946
			5.35	0.5	0.78	1552	1936
Ethylbenzene	8	0.8	7.43	0.48	0.76	1478	1958
			5.33	0.49	0.67	1546	1839
Cracked Fuel Simulant	2.52	0.5081	6.75	0.49	0.77	1530	2007
			5.17	0.46	0.76	1391	1969
n-Dodecane	12	0.4615	7.39	0.46	0.8	1357	1979
			5.2	0.55	0.79	1581	1983

Table 2: Step Swirl Combustor (SSC) Test Conditions.

Variable	Range
Inner vane angle (deg.)	0, 30 and 45
Outer vane angle (deg.)	30
Vane configuration	Co- and counter-swirl
Inner air velocity (m/s)	14.4
Re	18,000
Outer air velocity (m/s)	8.6
Re	14,800
Fuel velocity (m/s)	2.5
Re	3,200
Equivalence ratio	0.9
Fuel	Methane

Table 3: Experimental Test Conditions for Turbulent Swirling Jet Diffusion Flames.

Case	θ	Uj	Ua	Uc
	(deg.)	(m/s)	(m/s)	(m /s)
1	0	25	4	1
2	0	100	20	4
3	30	100	20	4
4	45	100	20	4

3.0 LIST OF RELEVANT PUBLICATIONS

Journal Publications

- 1. F. Takahashi and M. D. Vangsness, "Near-Field CARS Measurements and the Local Extinction of Turbulent Jet Diffusion Flames," *Dynamics of Heterogeneous Combustion and Reacting Systems*, AIAA Progress in Astronautics and Aeronautics Series, Vol. 152, pp. 37-55, 1993.
- 2. D. R. Ballal, M. D. Vangsness, S. P. Heneghan, and G. J. Sturgess, "Studies of Lean Blowout in a Research Combustor," NATO Advisory Group on Aerodynamics Research and Development, AGARD-CP-536, Paper Number 18, 1993.
- 3. M. D. Durbin and D. R. Ballal, "Studies of Lean Blowout in a Step Swirl Combustor," Transactions of ASME, Journal of Gas Turbine and Power, Vol. 118, pp. 72-78, Jan. 1996.
- 4. J. Zelina and D. R. Ballal, "Combustion Studies in a Well Stirred Reactor," AIAA Journal of Propulsion and Power, Vol. 10, pp. 132-139, 1994.
- 5. F. Takahashi, W. J. Schmoll, and J. L. Dressler, "Characteristics of a Velocity-Modulated Pressure-Swirl Atomizing Spray Measured by the Phase-Doppler Method," *AIAA Journal of Propulsion and Power*, Vol. 11, pp. 955-963, 1995.
- 6. F. Takahashi, W. J. Schmoll, G. L. Switzer, and D. T. Shouse, "Structure of a Spray Flame Stabilized on a Production Engine Combustor Swirl Cup," *Proceedings of 25th Symposium* (Int.) on Combustion, The Combustion Institute, pp. 183-191, 1994.
- 7. F. Takahashi, W. J. Schmoll, and J. L. Dressler, "Characterization of a Velocity-Modulation Atomizer," *Reviews of Scientific Instruments*, Vol. 65, pp. 3563-68, 1994.
- 8. F. Takahashi, "Sooting Correlations for Premixed Combustion," *Physical & Chemical Aspects of Combustion: A Tribute to Irvin Glassman* (Eds. R. F. Sawyer and F. L. Dryer) Gordon & Breach, New York, NY, 1996.
- 9. F. Takahashi and V. R. Katta, "Numerical Experiments on the Vortex-Flame Interactions in a Jet Diffusion Flame," AIAA Journal of Propulsion and Power, Vol. 11, pp. 170-176, 1995.
- 10. S. Zabarnick and J. Zelina, "Chemical Kinetics of NOx Production in a Well Stirred Reactor," AIAA Paper No. 94-3828, *Proceedings of 29th Intersociety Energy Conversion Engineering Conference*, pp. 649-653, AIAA, Washington D.C., 1994.
- 11. M. D. Durbin and D. R. Ballal, "Optimizing the Combustion Performance of a Step Swirl Combustor," AIAA Paper No. 94-3825, Proceedings of 29th Intersociety Energy Conversion Engineering Conference, pp. 631-635, AIAA, Washington D.C., 1994.

- 12. J. Zelina, R. C. Striebich, and D. R. Ballal, "Pollutant Emissions Research Using a Well Stirred Reactor," AIAA Paper No. 94-3827, in Proceedings of 29th Intersociety Energy Conversion Engineering Conference, pp. 644-648, AIAA, Washington D.C., 1994.
- 13. M. D. Durbin and D. R. Ballal, "Studies of Combustion and Emissions in a Model Step Swirl Combustor," *Proceedings of the FACT Vol. 18, pp. 17-21, ASME (Int.) Joint Power Generation Conference,* New York, NY, 1994.
- 14. J. Zelina and D. R. Ballal, "Studies of Pollutant Emissions in a Well Stirred Reactor," Proceedings of the FACT Vol. 18, pp. 12-16, ASME (Int.) Joint Power Generation Conference, New York, NY, 1994.
- 15. F. Takahashi, M. D. Vangsness, and M. D. Durbin, "Stabilization of Hydrogen-Jet Diffusion Flames With and Without Swirl," *Transport Phenomenon In Combustion*, (S. H. Chan, Ed.) Vol. 1, pp. 593-604, Taylor & Francis, Washington D.C., 1996.
- 16. F. Takahashi, W. J. Schmoll, D. D. Trump, and L. P. Goss, "Vortex-Flame Interactions and Extinction of Turbulent Jet Diffusion Flames," *Proceedings of the 26th Symposium (Int.) on Combustion, The Combustion Institute*, pp. 145-152, 1996.
- 17. F. Takahashi and V. R. Katta, "Unsteady Extinction Mechanisms of Jet Diffusion Flames," To appear in *Proceedings of the 26th Symposium (Int.) on Combustion, The Combustion Institute*, pp. 1151-1160, 1996.
- 18. F. Takahashi, M. S. Anand, M. D. Vangsness, M. D. Durbin, and W. J. Schmoll, "An Experimental and Computational Study of Swirling Hydrogen Jet Diffusion Flames," *Transactions of ASME, Journal of Engineering for Gas Turbines and Power*, Vol. 119, pp. 305-314, 1997.
- 19. M. D. Durbin, M. D. Vangsness, D. R. Ballal, and V. R. Katta, "Study of Flame Stability in a Model Step Combustor," *Transactions of ASME, Journal of Engineering for Gas Turbines and Power*, Vol. 118, pp. 308-315, 1996.
- 20. J. Zelina and D. R. Ballal, "Combustor Stability and Emissions Research Using a Well Stirred Reactor," ASME Paper No. 95-GT-109, to appear in *Transactions of ASME*, *Journal of Engineering for Gas Turbines and Power*, June 1996.
- 21. F. Takahashi, M. D. Vangsness, M. D. Durbin, and W. J. Schmoll, "Structure of Turbulent Hydrogen Jet Diffusion Flames with and without Swirl," *Transactions of ASME, Journal of Heat Transfer*, Vol. 118, pp. 877-884, 1996.
- 22. J. Zelina, J. Blust, and D. R. Ballal, "Combustion of Liquid Fuels in a Well Stirred Reactor," ASME Paper No. 96-GT-047, Presented at ASME Turbo Expo. '96, Birmingham, U.K., June 1996.

- 23. J. Zelina and D. R. Ballal, "Emissions Studies in a Well Stirred Reactor and Applications to Combustion Modeling," *Proceedings of FACT, Vol. 21, ASME (Int.) Joint Power Generation Conference*, pp. 255-263, October 1996.
- 24. G. J. Sturgess, A. L. Lesmerises, S. P. Heneghan, M. D. Vangsness, and D. R. Ballal, "Lean Blowout in a Research Combustor at Simulated Low Pressures," *Transactions of ASME, J. of Engineering for Gas Turbines and Power*, Vol. 118, pp. 773-781, 1996.
- 25. F. Takahashi and V. R. Katta, "A Numerical Study of a Methane Diffusion Flame over a Flat Surface," To appear in *Proceedings of the Second International Symposium on Scale Modeling*, June 1997.

UDRI Reports

- 1. F. Takahashi, M. D. Vangsness, and M. D. Durbin, "LDV Measurements in Swirling and Non-Swirling Coaxial Turbulent Air Jets--No. 5: 45 degree swirler, 100 m/s," University of Dayton Technical Report, UDR TR 93-22, May 1993.
- 2. F. Takahashi, M. D. Vangsness, and M. D. Durbin, "LDV Measurements in Swirling and Non-Swirling Coaxial Turbulent Air Jets--No. 6: 45 degree swirler, 25 m/s," University of Dayton Technical Report, UDR TR 93-23, June 1993.
- 3. F. Takahashi, M. D. Vangsness, and M. D. Durbin, "LDV Measurements in Swirling and Non-Swirling Coaxial Turbulent Air Jets--No. 7: 60 degree swirler, 25 m/s," University of Dayton Technical Report, UDR TR 93-24, July 1993.
- 4. F. Takahashi, M. D. Durbin, and M. D. Vangsness, "LDV Measurements in Swirling and Non-Swirling Coaxial Turbulent Hydrogen Jet Diffusion Flames--No. 1: No Swirl, 25 m/s," University of Dayton Technical Report, UDR TR 93-88, September 1993.
- 5. F. Takahashi, M. D. Durbin, W. J. Schmoll, and M. D. Vangsness, "LDV Measurements in Swirling and non-Swirling Coaxial Turbulent Hydrogen Jet Diffusion Flames--No. 2: No Swirl, 100 m/s," University of Dayton Technical Report, UDR TR 94-115, July 1994.
- 6. F. Takahashi, M. D. Durbin, W. J. Schmoll, and M. D. Vangsness, "LDV Measurements in Swirling and non-Swirling Coaxial Turbulent Hydrogen Jet Diffusion Flames--No. 3: 30-degree Swirl, 100 m/s," University of Dayton Technical Report, UDR TR 94-116, August 1994.
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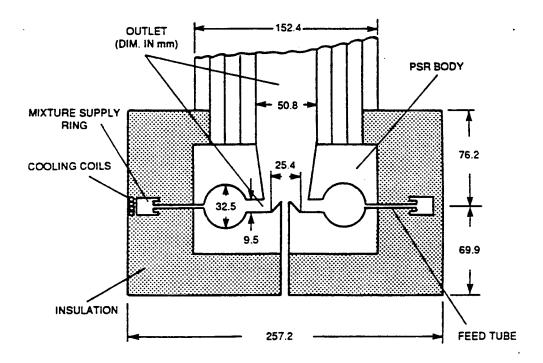


Fig. 1: Schematic diagram of a toroidal WSR (dimensions in mms)

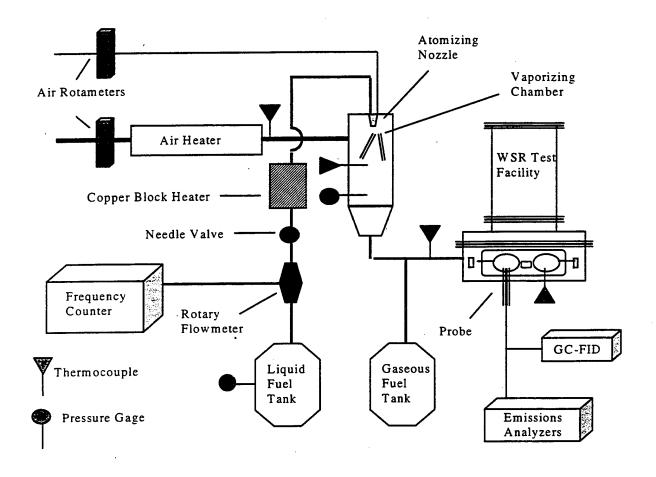


Fig. 2: WSR test facility and associated instrumentation.

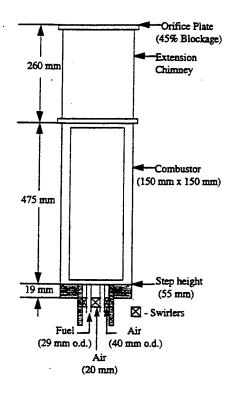


Fig. 3. Schematic of a Step Swirl Combustor.

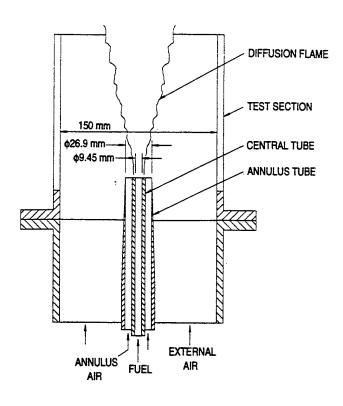


Fig. 4. Schematic of a swirling jet diffusion flame combustor

APPENDIX A WELL STIRRED REACTOR (WSR) (SELECTED DATA SET)

Table 1

n-Heptane Data							
CO2 (vol %)	O2 (vol %)	THC (ppmC)	Sample Temp (C)	Fuel/Air Temp (C)	m fuel (kg/s)	Q NOx (slpm)	m NOx (g/s)
5.99	13.66		37.48	46.05	0.000285402	97	1.47047E-05
6.22	12.38	8.78	35.99	46.79	0.000287163	0.00079334	2.52547E-05
6.52			36.73	46.77	0.000289859	0.001021629	3.25219E-05
6.77	10.78	3.77	38.81	46.48	0.000293094	0.00073678	2.34542E-05
6.95	14.03	2.47	36.76	46.64	0.000294509	0.001540609	4.90427E-05
7.06	16.08	1.98	37.30	46.33	0.000295464	0.00166663	5.30544E-05
7.23	16.04		39.51	45.84	0.000298376	0.001666583	5.30529E-05
7.42	15.88	1.52	39.16	46.15	0.000297397	0.001986506	6.32371E-05
7.60		1.18	38.26	45.98	0.000297886	0.002363961	7.52528E-05
7.75	16.31	96.0	38.55	45.94	0.000298376	0.002902822	9.24065E-05
8.07	14.43		41.10	45.73	0.000302381	0.003299521	0.000105035
8.39	13.41	0.74	40.32	44.84	0.000311937	0.004427578	0.000140945
8.46			39.54		0.000311385	0.005078365	0.000161661
8.71	12.98		41.66	44.77	0.000313049	0.006017739	0.000191565
8.94	11.58		43.36		0.000315873	0.007597016	0.000241838
9.11	11.19	0.30	42.60		0.000316446	0.00913821	0.0002909
9:36	10.92	0.16	42.29		0.000317022	0.011121049	0.00035402
9.58	9.97	0.10	44.56	43.34	0.000318765	0.012663211	0.000403112
9.75	8.78	0.12	46.70	42.83	0.000324149	0.0148748	0.000473514
06.6	8.62	0.05	45.18	42.79	0.000324762	0.017341063	0.000552024
9.94	8.43	0.00	47.81	41.77	0.000324149	0.019061625	0.000606795

Table 1 cont.

									-	
									+	
n-Heptane Data	Data								-	
									Fro	From calorimetri
EI NOx	Q CO (slpm)	m CO (g/s)	EI CO	Q THC (slpm)	m THC (g/s)	EI THC	'n	AFT	Tf (K)	(K)
0.05	1.059430055	0.020482314	71.77	0.006419935	7.11436E-05	0.25	0.983600757	1.	1590	1570
0.0		0.922163828 0.017828501	62.09	0.003556413	3.9411E-05	0.14	0.985891477		1618	1600
0.11	0.766666559	0.01482222	51.14	0.001942141	2.15222E-05	0.07	0.988418412		1658	1643
0.08		0.67427854 0.013036052	44.48	0.001457492	1.61514E-05	90.0	0.989935935		1693	1680
0.17	1	0.626955919 0.012121148	41.16	0.000940867	1.04264E-05	0.04	0.990702836		1714	1701
0.18		0.608062694 0.011755879	39.79	0.000744042	8.24523E-06	0.03	0.991018443		1733	1720
0.18		0.591844621 0.011442329	38.35	0.000669736	7.42179E-06	0.02	0.991345356		1757	1744
0.21	Í	0.573612066 0.011089833	37.29	0.000548287	6.07593E-06	0.02	0.991588108		1789	1777
0.25	1	0.579002354 0.011194046	37.58	0.000417685	4.62865E-06	0.02	0.991528038		1811	1798
0.31	L	0.590004965 0.011406763	38.23	0.000336144	3.72504E-06	0.01	0.99138457		1827	1814
0.35	0.640894491	0.012390627	40.98	0.000296169	3.28204E-06	0.01	0.990767944		1879	1865
0.45		0.738219998 0.014272253	45.75	0.000252901	2.80257E-06	0.01	0.989694875		1918	1902
0.52	l	0.759012258 0.014674237	47.13	0.000166691	1.84721E-06	0.01	0.989389172		1935	1918
0.61		0.838610228 0.016213131	51.79	0.000129309	1.43296E-06	0.00			1966	1947
0.77	1	0.926864394 0.017919378	56.73	0.000128582	1.4249E-06	0.00			2002	1981
0.92	1.000747963	0.019347794	61.14	9.68792E-05	1.07358E-06	0.00	0.986237794		2025	2002
1.12	1.11776253	0.021610076	68.17	5.14127E-05	5.69738E-07	0.00			2054	2028
1.26	1.215337339	0.023496522	73.71	2.98897E-05	3.31228E-07	0.00	0.983411422		2098	2069
1.46	1.337551537	0.02585933	79.78	3.65914E-05	4.05494E-07	0.00	0.982046378		2121	2089
1.70	1.437255479	0.027786939	85.56	1.44672E-05	1.60321E-07	0.00	0.980745331		2148	2113
1.87	1.45230253	0.028077849	86.62	1.37137E-07	1.51971E-09	0.00	0.980507457		2155	2119
									-	

Table 1 cont.

n-Heptane Data	. Data								
									From calorimetri
EI NOx	\sim	m CO (g/s)		Q THC (slpm)	m THC (g/s)	ЕІ ТНС	u	AFT	Tf (K)
0.00	- 1		51.97				0.988304063	1609	1594
0.14	1		53.56			•	0.987946816	1638	1622
0.14			46.12				0.989620444	1665	1651
0.24			46.97				0.98943021	1757	
0.29	- 1		47.97				0.98920566		1761
0.50			27.67				0.987021801	1877	
0.69	- 1	0.004949402	66.57				0.98501982		
0.87	0.285354386	0.005516851	74.21				0.983299837		
1.19	0.335390468	0.006484216	87.22				0.98037151		
1.47		0.007107831	95.63				0.978480798	2048	2011
1.80	1	0.411627828 0.007958138	107.07				0.975906466	2106	

Table 2

Methane Data)ata						i		
								From CETPC	
EI NOx	Q CO (slpm)	m CO (g/s)			m THC (g/s)	EI THC	u	Tad-Q	Tf
0.11	1.427523187	0.027598782	114.05	0.19555159	0.002167038	8.96	0.967989737	1535.25	1495
0.03	1.051367361	0.020326436	82.49	0.06760117	0.000749134	3.04	0.980286054	1586.77	1561
0.05	0.859019275	0.016607706	62.99	0.027631006	0.000306198	1.23	0.985266762	1619.52	1600
0.0	0.671099161	0.012974584	51.27	0.00687036	7.6135E-05	0:30	0.989336131	1652.34	1638
0.24	0.596006265	0.011522788	45.13	0.004185381	4.6381E-05	0.18	0.990694899	1684.33	1671
0.21	0.542003872	0.010478742	40.87	0.001251105	1.38643E-05	0.05	0.991685064	1715.81	1704
0.24	0.52599762	0.010169287	40.36	0.001255174	1.39094E-05	90.0	0.991786622	1730.3	1718
0.28		0.523015258 0.010111628	40.13	0.001262387	1.39893E-05	90.0	0.991832561	1744.89	1733
0.37		0.550303166 0.010639195	41.49	0.000843583	9.34831E-06	0.04	0.991576184	1774.63	1762
0.47	0.595696147	0.011516792	43.96	9.64195E-05	1.06849E-06	00.0	0.99110907	1806.03	1792
0.59		0.697880309 0.013492353	50.65	0.000111834	1.23931E-06	00.0	165252686.0	1850.54	1834
0.75		0.795270891 0.015375237	57.48	0.00012912	1.43087E-06	0.01	0.988376604	1878.43	1860
0.87	ľ	0.857125657 0.016571096	61.44	0.000796063	8.82171E-06	0.03	0.987548675	1904.58	1884
1.05	1.026408596	0.0198439	72.09	0.00078427	8.69101E-06	0.03	0.985396947	1933.74	1910
1.38		1.266021044 0.024476407	88.20	0.000315169	3.49259E-06	0.01	0.982158043	3 1986.33	1956
1.48	l	1.414584955 0.027348642	95.87	0.000417878	4.63078E-06	0.02	0.980604783	3 2013.27	1980
1.69	1.454991767	0.028129841	100.56	0.000399233	4.42416E-06	0.02	0.979656163	3 2024.65	1989
0.01	2.081849623	0.040249093			0.004235288	44.25		5 1639	1544
0.05		1.609074163 0.031108767		0.148141576	0.001641656	3.33	0.976363527	7 1658	1625
0.15	1.038756601	0.020082628	65.55		0.000247454	0.17	0.986579441	1710	1691
0.26	1.013079036	0.019586195			0.000224375	0.00	0.987217042	1725	1707
0.24		0.81889749 0.015832018	53.02		0.000108178	0.05		9 1742	1727
0.22	0.804098926	0.015545913	51.87	0.00629188	6.97245E-05	0.03	0.989481075	5 1764	1748
0.37	0.753472682	0.014567139			4.66299E-05	0.01	0.990269466	6 1810	1796
0.46	0.73789678	0.014266004			3.51759E-05	0.01	0.990405443	3 1837	1822
0.43	0.76937639	0.01487461			3.80451E-05	0.01	0.990068424	1886	1870
0.56	0.877654443	0.016967986	55.39	0.002509377	2.78081E-05	0.01	0.988799157	7	1920
92.0		0.019224701	61.42	0.001894361	2.09927E-05	0.00	0.987582435	1981	1960
0.77	1.015595233	0.019634841	63.63	0.003499969	3.87855E-05	0.01	0.98713276		1979
0.95	1.206618849	0.023327964	73.74	0.002248064	2.49123E-05	0.00	0.985091391	2034	2008
1.18	1.412699972	0.027312199	85.14	0.001635632	1.81255E-05	0.00	0.982788221	1 2060	2030

Table 3

Toluene Data	ata								
									From calorimetric
EI NOx	Q CO (slpm)	m CO (g/s)	EI CO	Q THC (slpm)	m THC (g/s)	EI THC	η	AFT	Tf(K)
		1.52282931 0.029441367	107.33	0.285034644	0.003158659	11.52	0.961744428		
0.00		1.15075837 0.022247995	71.25				0.982248081	1585	5 1562
0.00	0.954687271	0.018457287	58.34				0.985465699	1625	5 1606
0.00		0.787585701 0.015226657	47.61				0.988138017	1665	
0.01		0.734045583 0.014191548	44.13				0.98900451	1689	
0.01		0.711321576 0.013752217	42.65				0.989374102	1710	
90.0	0.703636848	0.013603646	41.78				0.989590394	1743	
0.13	0.667873784	0.012912226	41.19				0.989737572	1774	
0.16	!	0.013428772	42.61				0.989383188	1798	
0.24	0.772246114	0.014930092	46.87				0.988321759	1840	0 1822
0.49	0.825983822	0.015969021	49.80				0.987593488	1878	8 1859
0.68	0.876777168	0.016951025	52.64				0.98688448	1907	7 1886
0.84	1.02864168	0.019887072	60.14				0.985017251	1968	8 1943
1.00	1.126568162	0.021780318	65.49				0.983685087	1997	7 1969
1.17		0.024424846	71.62				0.982157195	2040	2009
1.50	1.371607361	0.026517742	77.29				0.98074509	2071	1 2037
1.63	1.429798214	0.027642765	79.95				0.980080983	2077	7 2042
1.86		1.504731419 0.029091474	83.75				0.979133879	2103	3 2065
1.88	1.485276721	0.02871535	82.80				0.979371775	2115	5 2078
2.12		1.523663702 0.029457498	84.68				0.978904081	2134	

Table 3	cont								
Toluene Data	æ								in to minus of m
	П		- 11					LIO	rioin calorinieun
EI NOx Q	Q CO (slpm)	m CO (g/s)	EI CO		-	h	AFT	Tf (K)	_
0.00	1.672386825	1.672386825 0.032332812	84.81			0.978870992		1566	1540
0.00	1.518894954	1.518894954 0.029365302	75.09			0.981293258		1593	1569
0.00	1.424239061	0.027535289	60.69			0.982786106		1613	1591
0.00	1.337902538	1.337902538 0.025866116	63.54			0.984170813		1637	1616
0.01	1.264854858	0.024453861	27.68			0.985629974	-1	1687	1667
0.12	1.261544361	0.024389858	26.68			0.985877857		1704	1684
0.12	1.270685854	0.024566593	56.24			0.985988698		1721	1702
0.11	1.282212796	0.024789447	92:29			0.986109154		1737	1718
0.13	1.307017662	0.025269008	56.20			0.985999107	1	1774	1754
0.24	1.269026634	0.024534515	55.55			0.986159912	1	1802	1782
0.22	1.369081331	0.026468906	58.73			0.985367611		1847	1825
0.31	1.426483912	0.027578689	90'19			0.984788873		1878	1854
0.59	1.472452046	0.028467406	63.17			0.984262811		1903	1878
0.73	1.608998141	0.031107297	67.92			0.983078713		1945	1917
0.86	1.742971917	0.033697457	71.85			0.98209916		1985	1955
1.00	1.818164453	0.035151179	74.23			0.981507267		2017	1985
1.09	1.912084282	0.036966963	77.49			0.980694725		2046	2013
1.31	1.975032016	0.038183952	79.45			0.980207021		2069	2035
1.51	2.090147773	0				0.979157932		2093	2057
1.63	2.08991328	0.04040499	83.23			0.979265012		2124	2087
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Ethylbenzene data	ne data						
							From calorimete
	Q CO (slpm)	m CO (g/s)	EIC		h	Tad-Q	Tf
	1.07023932	1.07023932 0.020691294			0.981680273	1496.28	1475
	0.947243176				0.984242422	1516.15	1497
	0.846799007				0.98591333	1535.02	1518
	0.796446658	0.015397969			0.986595981	1534.65	1518
	0.746781736		50.88		0.987552801	1553.7	1538
0.04	0.721026572		48.40		0.988159441	1554.22	1540
	0.657076728		43.66		0.9893187	1591.53	1578
0.04	0.639391602	0.012361571	43.18		0.989436845	1590.96	1578
0.13	0.608776113	0.011769672	40.37		0.990124198	1609.89	1597
0.15	0.592720133	0.011459256	39.18		0.990414435	1628.1	1616
0.12	0.598117336	0	39.74		0.990277131	1627.97	1615
0.15	0.590994319	0.01142589	38.58		0.99056197	1664.4	1652
0.19	0.600333595	0.011606449			0.990372158	1681.77	1669
	0.601091553		39.15		0.99042114	1699.66	1687
	0.609136626	0.011776641	39.30		0.990386572	1717.26	1704
- 1	0.666759479	0.666759479 0.012890683	42.73		0.98954601	1734.9	1720
0.38	0.686175258	0.686175258 0.013266055	43.05		0.98946881	1752.96	1738
0.44	0.727608422	0.727608422 0.014067096	46.37		0.988654927	1769.08	1753
ŀ	0.754120274	0.754120274 0.014579659	46.93		0.988519234	1787.11	1770
	0.819295006	0.819295006 0.015839703	50.81		0.987570638	1820.34	1802
	0.846161503		53.15	and the state of t	0.986998512	1819.69	1800
	0.913035177		56.75		0.986116096	1836.76	1816
	0.962089077		59.24		0.985507273	1837.71	1816
	0.93663301	0.018108238	58.08		0.985790527	1868.76	1847
	1.123731527	0.021725476	67.87		0.983396586	1902.66	1877
	1.18011037	0.022815467	71.19		0.982585045	1918.37	1891
	1.257966352	0.024320683	76.35		0.981321921	1933.58	1904
	1.279640007	0.024739707	76.33		0.981326903	1935.04	1905
	1.407638441	0.027214343	85.02		0.97920179	1950.17	1916
1.92	1.448391582	0.028002237	85.52		0.979078194	1981.77	1947

Ethylbenzene data								
								From calorimet
õ	Q CO (slpm)	m CO (g/s)	EI CO			u	Tad-Q	Tf
452	1.452267943	0.02807718				0.981504155		
431	794889	1.431794889 0.027681368	73.34			0.982057964		
228	3189258	1.228189258 0.023744992	61.87			0.984863552	1582.14	4 1563
19	1.196335015	0.023129144				0.985658017	1601.9	9 1584
15	1.153693299	0.022304737	55.33			0.986464466	1640.1	1 1622
15	1.158119413	0.022390309	54.42			0.986687756	1677.74	4 1660
21,	1.217472473	0.023537801				0.986271674	1732.79	9 1714
29	1.298497938	0.025104293	59.27			0.985501178	1768.73	3 1748
41	6507585	1.416507585 0.027385813	64.01			0.984340559	1804.22	1781
57	1.571621388	0.03038468				0.982941969	1856.65	5 1831
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Table 5

Cyclohexane data	ine data								
									From calorimet
EI NOx	Q CO (slpm)	m CO (g/s)	EI CO	Q THC (slpm)	m THC (g/s)	EI THC	u	Tad-Q	Tf (K)
		1.018134583 0.019683935	67.16		0.001452488	4.96	0.97955362		
0.04		0.033408211	122.08	0.094836805	0.00105095	3.84	0.968001745	1471.36	1435
0.02	1.335671095	0.025822975	93.46	0.024192425	0.000268092	0.97	0.977472811	1489.58	1463
0.06			75.75	0.01022801	0.000113343	0.41	0.982121772	1507.87	1487
0.07	9	0.016158446	57.75	0.003093479	3.42809E-05	0.12	0.986558656	1526.15	1510
0.10		0.01146667	41.07	0.000809443	8.96998E-06	0.03	0.990496017	1561.91	1550
0.12		0.009242707	33.38	0.000506604	5.61402E-06	0.02	0.992280058	1579.32	
0.14	0.452784081	0.008753826	31.46	0.000444292	4.92349E-06	0.02	0.992725647	1597.09	
0.18		0.008028519	29.26	0.000370812	4.10921E-06	0.01	0.993236632	1613.99	1605
0.22		0.007917198	28.58	0.000316772	3.51036E-06	0.01	0.993396487	1648.62	1640
0.29	1	0.008315268	29.70	0.000269685	2.98856E-06	0.01	0.993140264	1699.32	1690
0.35		0.0088526	31.39	0.000249904	2.76935E-06	0.01	0.992751185	1716.23	1706
0.40	0.477427491	0.009230265	32.56	0.000226754	2.51282E-06	0.01	0.992482111	1748.82	1738
0.55		0.011357702	38.22	0.000206818	2.29189E-06	0.01	0.991177706	1799.33	1786
99.0		0.012477328	41.74	0.000188113	2.08461E-06	0.01	0.990366144	1815.57	1801
0.81		0.01383378	45.96	0.000176522	1.95616E-06	0.01	0.989392431	1831.85	1816
0.95		0.015098036	49.91	0.000164278	1.82048E-06	0.01	0.988483831	1862.76	1845
1.03	0.820912651	0.015870978	52.00	0.000157147	1.74146E-06	0.01	0.988000537	1878.46	1860
1.23	0.914414393	0.017678678	57.51	0.00015051	1.6679E-06	0.01	0.986729893	1908.87	1888
1.40	1.012644203	\sim 1	62.41	0.000146328	1.62155E-06	0.01	0.985600265	1939.7	1916
1.60	1.109310004		67.19	0.000140966	1.56214E-06	0.00	0.984497365	1955.91	1931
1.71	1.15231874	0.022278162	69.39	0.000136555	1.51326E-06	0.00	0.983991873	1970.74	1944
1.96	1.24011397	0.023975537	74.38	0.000127556	1.41353E-06	0.00	0.982841611	1985.85	1957
2.30	1.357410162	0.026243263	80.84	0.000122669	1.35938E-06	0.00	0.981351808	2028.49	1997
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			0.984640248	0.987579872	0.988713282	0.988914084	0.98796886	0.987593074	0.985861117	0.984916117	0.981886859	0.980288285	0.979892924	0.978615088	0.978525315											
		EI THC n	0.44	0.18	0.02	0.00	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	•										
		m THC (g/s)	0.000152644	6.42121E-05	2.69919E-05	2.35804E-05	2.2516E-05	1.7748E-05	1.52785E-05	1.43485E-05	1.38187E-05	1.31107E-05	1.26111E-05	1.22487E-05	1.18476E-05											
		Q THC (slpm)	0.01377443	0.005794448	0.002435723	0.002127873	0.00203182	0.001601567	0.00137872	0.001294794	0.001246989	0.001183098	0.001138017	0.001105311	0.001069115											
		EI CO	64.67	53.08	48.63	47.81	51.93	53.61	61.15	65.26	78.40	85.34	87.06	92.60	93.00											
		m CO (g/s)	0.022238005	0.019184611	0.01847162	0.019069358	0.02189595	0.022642651	0.026912207	0.028560379	0.034892711	0.038719894	0.040214024	0.042602707	0.043576135											
o cont		Q CO (slpm)	1.150241659 0.022238005	0.992307483 0.019184611	0.955428599	0.986346086 0.019069358	1.13254914	1.171171581	1.392010714	1.477260974	1.804795419	2.00275312	2.080035739	2.203588279	2.25393804											
Table 5 cont	2 2	EI NOx																								

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Ethane data	ıta								
EI NOx	0	m CO (g/s)	EI CO	Q THC (slpm)	m THC (g/s)	EI THC	u	AFT	Tf
0.00	71		128.88	0.151877866	0.00168306	6.42	0.96613968		
0.04	- 1	- 1	133.08	0.131811214	0.001460688	5.71	0.96595908		
0.05	- 1	- 1	83.79	0.010317853	0.000114339	0.45	0.981715202		
0.02		0.013962069	53.27	0.00185912	2.06021E-05	0.08	0.988579725		
0.10		0.010100011	37.94	0.000867873	9.61748E-06	0.04	0.991887632		
0.12	0.442023781	0.008545793	32.35	0.000618939	6.85888E-06	0.03	0.993086779		
0.14	0.398042466	0.007695488	29.36	0.000523008	5.7958E-06	0.02	0.993726689		
0.20		0.007272882	27.32	0.000449581	4.98211E-06	0.02	0.994165692		
0.27		0.007277209	27.55	0.000362923	4.02179E-06	0.02	0.994119901		
0.36			29.84	0.000325502	3.60711E-06	0.01	0.993634785		
0.42		0.008328203	31.04	0.000303481	3.36307E-06	0.01	0.993379632		
0.53		0.009811866	35.47	0.000282268	3.128E-06	0.01	0.992437814		
0.64		0.54927239 0.010619266	38.68	0.000264998	2.93662E-06	0.01	0.991755166		
0.80	0.643967657 0.012450041	0.012450041	44.34	0.000250288	2.77361E-06	0.01	0.990550935		
0.91		0.013152184	46.84	0.000232937	2.58133E-06	0.01	0.99001928		
1.11		0.01504299	52.41	0.000214723	2.37949E-06	0.01	0.98834577		
1.29	0.855255642	0.016534942	58.03	0.000203854	2.25905E-06	0.01	0.987638866		
1.50	0.977076857	0.018890153	64.41	0.000196207	2.1743E-06	0.01	0.986280172		
1.78	1.126209477	0.021773383	73.20	0.000190764	2.11399E-06	0.01	0.984408588		
2.05	- 1	0.02405996	80.33	0.000182589	2.02339E-06	0.01	0.982891911		
2.27	1.355660373 0.026209434	0.026209434	86.31	0.000176448	1.95534E-06	0.01	0.981619619		

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29262	POSF 2926 Neat data							-		The second content
										From calorimetri
(g/F	m NOx (g/EI NOx	Q CO (slpm)	m CO (g/s) EI CO			Q THC (slpm)	m THC (g/s)	EI THC	Ξ	Tad-Q
4.37E-05	0.19	0.19 3.238634235	0.062614	2	277.66	1.723903871	0.019103728	84.72		10
1.09E-05	0.05	0.05 2.253203628	0.043562	1	199.13	0.20592265	0.002281966	10.43	3 0.942853624	
2.19E-05	0.10	0.10 1.733723266	0.033519	—	147.08	0.066336188	0.000735116	3.23	3 0.962271381	
1.65E-05	0.07	1.380051604	0.026681	_	110.49	0.016708883	0.000185162	0.77	7 0.973313649	6
1.68E-05	0.07	1.304054844	0.025212		106.68	0.011780532	0.000130548	0.55	5 0.974421812	2
3.13E-05	0.13	1.07501896	0.020784		85.74	0.006901937	7.6485E-05	0.32	0.979569927	7
4.16E-05	0.17	0.874463884	0.016906		67.05	0.007369393	8.16652E-05	0.32	0.983947455	5
7.05E-05	0.27	0.813386248	0.015725		60.21	0.005106055	5.65836E-05	0.22	2 0.985657762	2
9.26E-05	0.35	0.35 0.808957661	0.01564		58.60	0.005054539	5.60127E-05	0.21		4
0.000107	0.40	0.80129035	0.015492		58.36	0.005047319	5.59327E-05	0.21	1 0.986099594	4
0.000116	0.44	0.791314992	0.015299		58.23	0.004772192	5.28838E-05	0.20	0.986139046	6
0.000156	0.58	8 0.852596928	0.016484		61.46	0.004656299	5.15996E-05	0.19	9 0.985389025	5
0.000198	0.73	3 0.910885885	0.01761		64.88	0.004555943	5.04874E-05	0.19		9
0.000241	0.89	0.967644447	0.018708		69.89	0.004439428	4.91963E-05	0.18	8 0.983704415	5
0.000325	1.17	7 1.07793366	0.02084		75.24	0.004324863	4.79267E-05	0.17	7 0.982175427	7
0.000456	1.58	3 1.242317485	0.024018		83.11	0.004326513	4.7945E-05	0.17		3
0.000598	2.04	1.374072653	0.026565		90.61	0.004209006	4.66428E-05	0.16	6 0.978584503	3
0.000676	2.28	3 1.440013554	0.02784		93.71	0.004209544	4.66488E-05	0.16	16 0.977860165	5
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From CETPC Tad-Q 0.962915205 0.980572496 0.948540792 0.984196278 0.988586472 0.989947485 0.990723038 0.990651483 0.99054913 0.984299476 0.990501554 0.99038383 0.989604856 0.988809806 0.983664853 0.982324909 0.981205599 0.979988943 0.972581 0.986373021 0.98706161 0.985761177 0.14 90.0 6.99 2.58 0.63 0.24 |0.00|0.08 0.02 90.0 0.05 0.05 0.05 0.05 0.040.04 0.04 0.04 0.04 0.03 EI THC 1.63245E-05 1.3128E-05 0.001849817 0.000173349 3.93364E-05 2.65978E-05 2.14903E-05 1.86525E-05 1.72934E-05 1.53961E-05 1.45424E-05 1.40505E-05 1.18733E-05 1.13255E-05 1.10942E-05 1.08308E-05 0.000700751 6.48911E-05 1.24209E-05 1.16901E-05 1.02976E-05 0.004519807 Q THC (slpm) |m THC (g/s) 0.166925868 0.407863464 0.063235198 0.015642833 0.005855718 0.003549685 0.002400159 0.001939268 0.001683186 0.001560544 0.001473108 0.001389335 0.001312291 0.001267903 0.00118466 0.0011208550.0010714360.001054902 0.001022005 0.001001128 0.000929244 0.000977361 132.29 109.18 82.61 68.44 59.28 49.76 43.86 41.46 40.84 42.05 45.48 68.85 40.51 48.99 56.69 62.42 71.65 77.54 41.31 82.47 Q CO (slpm) | m CO (g/s) | EI CO0.016505 0.035008 0.029616 0.022583 0.018854 0.014003 0.012479 0.011605 0.011432 0.011853 0.013239 0.01426 0.016695 0.018436 0.022029 0.023918 0.025858 0.011621 0.0121 0.021068 0.027723 0.16 0.64547474 0.20 0.600279968 0.23 0.591315656 0.04 1.810783343 0.05 1.531864542 0.06 1.168090805 0.08 0.975187779 |0.10| 0.85370205 0.12 0.724297523 0.30 0.601103208 0.89 0.863526916 0.95356205 0.52 0.684758108 0.65 0.737584396 1.32 1.089733388 1.139429304 1.237141126 1.337481562 1.433930462 0.35 0.613088431 0.40 0.625842902 |0.05| 1.9753400271.10 1.45 1.71 1.92 m NOx (g/{EI NOx 1,31E-05 Table 1.37E-05 1.15E-05 2.17E-05 2.68E-05 3.42E-05 6.59E-05 8.49E-05 9.93E-05 0.000114 0.00015 0.000188 0.000326 1.72E-05 4.48E-05 5.47E-05 0.000263 0.000403 0.000444 Dodecane 0.000527 0.000602 0.00069

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	From CETPC	Tad-Q																										
	ഥ	T	0.936841046	0.971293173	0.978947282	0.982649095	0.985450271	0.98731826	0.988914655	0.989617904	0.989795516	0.988972154	0.988306929	0.987224221	0.985762792	0.984868309	0.98438458	0.982717131	0.981949518	0.980971411	0.979264843							
		μ	0.936	0.971	0.978	0.982	0.985	0.98	0.988	0.989	0.989	0.988	0.988	0.987	0.985	0.984	0.98	0.982	0.981	0.980	0.979							
			19.04	3.18	0.98	0.40	0.22	0.15	0.12	0.10	0.09	0.08	0.08	0.08	0.07	0.02	0.07	0.07	0.07	0.07	0.07							
		EI THC																										
			0.005892677	0.001023589	0.000322803	0.000134222	7.47702E-05	5.1599E-05	4.28291E-05	3.91119E-05	3.56849E-05	3.46511E-05	3.34703E-05	3.29333E-05	3.22339E-05	3.19553E-05	3.16752E-05	3.106E-05	3.05807E-05	3.0232E-05	2.97545E-05							
		m THC (g/s)	0.005	0.001	0.000	0.000	7.477	5.15	4.282	3.911	3.568	3.465	3.347	3.293	3.223	3.195	3.167	3.1	3.058	3.02	2.975							
			0.531750048	0.092367778	0.029129489	0.01211212	0.006747196	0.00465625	0.00386486	0.003529423	0.003220177	0.003126886	0.003020334	0.002971868	0.002908762	0.002883617	0.002858338	0.002802828	0.002759577	0.002728108	0.002685019							
1		Q THC (slpm)	0.531	0.092		0.01	0.006	0.00	0.00			0.003																
			193.93	112.23	88.25	74.52	63.01	55.11	48.21	45.18	44.46	48.11	51.05	55.82	62.26	66.19	68.33	75.67	79.05	83.35	90.86							
		(g/s) EI CO																										
		m CO (g/s)	0.060016	0.036164	0.02916	0.025087	0.02171	0.019538	0.017616	0.016962	0.017612	0.019887	0.02134	0.023881	0.026792	0.028833	0.029944	0.033577	0.0353	0.037463	0.041375							
		1						_		_				_			<u> </u>		4679		Ļ							
		Q CO (slpm)	3.104254418	1.87056285	1.508280786	1.297598116	1.122932965	1.010566917	0.911158577	0.877345771	0.910982158	1.028638383	1.103809539	1.23523187	1.385787027	1.491342782	1.548825605	1.736735288	1.825884679	1.937720309	2.140092976							
			9.05	0.05	90.0	0.08	0.0	0.11	0.15	0.19	0.28	0.39	0.50	0.63	0.80	0.92	1.00	1.21	1.36	1.50	1.81							
2000		EI NO																										
Dodecane		m NOx (g/EI NOx	1.54E-05	1.67E-05	2.11E-05	2.56E-05	3.11E-05	4.05E-05	5.38E-05	7.21E-05	0.000109	0.000161	0.000207	0.000271	0.000345	0.000402	0.000439	0.000537	0.000607	0.000676	0.000822							

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Table 9

Phi A M R B Tau (ms) Vaporizer (C) NOx (ppmV) CO (ppmW) 0.49 25381 09013 29.118075741 285.0223 3651.49346 6.95 20.72 1.92 1397 0.51 25384.12878 29.11804971 285.0243 3748.49687 6.77 11.01 3.47 108 0.52 25386.12878 29.1180477 284.9379 3735.194425 6.79 18.87 6.74 104 0.60 25340.28712 29.17804707 284.9379 3735.194425 6.75 19.37 19.41 465 0.60 25340.288270 29.1784600 284.8779 3735.308823 6.75 19.29 1446 1456 0.60 25340.288270 284.8779 3735.30822 4.757 3735.3082 4.757 3334 3334 4.957 0.60 25340.288270 284.776 3735.3082 4.757 3745.3082 1.942 1.446 1.446 1.446 1.446 1.446 1.446 1.44	Endother	Endothermic Simulant data	data							
0.4 2338 (1.090) M SA B SA Tau (ms) Vaporized (2) CO (p) 0.51 2538 (1.090) 20.1005741 28.5 0.23 3651 49346 6.95 20.7 1.02 0.51 2538 (1.282) 29.16083779 28.5 0.63 3675.44377 6.90 18.70 2.21 0.52 2538 (1.282) 29.16083779 28.5 0.63 3748.446897 6.71 17.10 3.47 0.52 2538 (2.210) 29.1790700 284.939 373.43463 6.72 18.87 6.78 0.57 2538 (2.210) 29.1790700 284.939 375.19423 375			,			,				
25381.09013 29.17075741 285.0252 3651.49346 6.95 20.72 1.92 25381.09013 29.17075741 285.0253 3651.49347 6.79 18.70 2.21 2536.29172 28.50428 3.651.4937 6.74 18.70 3.47 2536.29172 29.176683779 28.49329 3735.191425 6.76 18.28 5.68 25346.66643 29.17841609 284.9252 3735.191425 6.76 19.37 8.70 25340.80836 29.17841609 284.9252 3735.8843 375.8943 6.75 19.29 14.16 25340.80836 29.17841609 284.9254 375.8949 6.75 19.29 14.16 25318.7955 29.18477 384.7761 375.2949 6.75 19.29 14.16 25318.795 29.18477 375.2949 6.75 19.29 14.16 25318.797 284.857 374.2949 6.75 19.29 14.16 25318.797 28.856.244 374.5949 6.75 19.29	- 1	1			B	Tau (ms)	Vaporizer	NOx (ppmV)		CO2 (vol %)
2534.33618 29.16894971 285.0428 3675.9437 6.90 18.70 2.21 2536.6253 373.48496897 6.77 17.10 3.47 2536.62642 29.17967702 284.9439 3773.519425 6.79 18.28 5.68 2534.62643 29.17967602 284.952 375.88493 6.76 19.37 8.70 2534.02872 29.17967602 284.952 375.88493 6.76 19.37 8.70 2534.02872 29.1796866 284.952 375.8820721 6.75 19.42 11.44 2531.02872 29.1888706 284.887 375.20487 6.76 19.27 33.48 2531.0360 29.1888706 284.887 375.29484 6.76 19.27 33.48 2531.03641 29.1967464 377.5451 6.76 19.27 33.44 2528.03844 29.1682256 284.776 377.5451 6.76 19.27 46.37 2528.03849 29.21860487 377.5451 3772.5461 377.5451 252.87	0.45	į		285.0252				1.92	1392.68	7.01
25368.1282 29.16683770 28.0635 348.406897 677 17.10 3.47 25366.05412 29.1740702 28.0493 373.574654 6.72 18.28 5.68 25340.08472 29.1740702 28.4953 3773.574654 6.76 19.37 8.70 25340.0872 29.1740702 28.4952 3750.888493 6.76 19.16 11.84 25340.0802 29.17841609 284.9504 383.250751 6.61 19.16 11.84 25340.8082 29.17841609 284.953 3818.718018 6.63 19.29 14.16 25340.8082 29.188770 284.8357 3745.204954 6.75 19.29 14.16 25298.2083 29.18677249 284.756 3745.204954 6.76 19.29 14.16 25208.2084 29.18677 3745.204954 6.76 19.24 46.37 25208.2087 28.4786 3745.90424 6.75 19.24 46.37 25208.2344 29.18677 3745.90424 6.75 19.24	0.51			285.0428		96.90		2.21	1237.11	7.20
25386 2917 29.17907602 284.9439 3713.574634 6.72 18.28 5.68 25346 2917 29.17907602 284.9597 373.5119425 6.79 18.87 6.74 25340 2832 29.1780927 284.9597 373.5191435 6.76 19.37 8.70 25340 2882 29.17841609 284.9504 382.502751 6.63 19.29 14.16 25333.2603 29.179986 284.8379 375.30852 29.17841609 19.29 14.16 25318.7955 29.188370 284.8377 375.30852 29.17976 19.29 23.05 2528.2031 29.188370 284.8375 376.509924 6.76 19.24 46.37 2528.2346 29.188677 284.564 377.537234 6.79 19.24 46.38 2528.28.3445 29.2188097 284.564 377.537234 6.79 19.24 46.38 2528.6.3445 29.2188097 284.564 374.590123 6.75 19.24 47.45 2528.6.3463 29.21860683	0.53			285		6.77	17.10	3.47	1084.26	7.60
25346.66643 29.17746377 284.9597 3735.191425 6.79 18.87 6.74 25340.68643 29.17746377 284.9524 375.888493 6.76 19.37 8.70 25340.8877 29.1868493 36.66 19.16 11.84 25340.8877 29.188718018 6.67 19.29 14.16 25318.7955 29.1858370 284.837 3745.294954 6.76 19.29 14.16 25318.7955 29.1858370 284.837 3745.294954 6.76 19.29 17.40 25280.2038.2 29.185877 3745.294954 6.76 19.27 33.84 25286.38445 29.21862255 284.7567 3775.37234 6.76 19.23 10.745 25286.38445 29.21862275 344.786 3745.901239 6.75 19.27 107.82 25286.386.38445 29.21860477 284.5264 374.501239 6.75 19.27 107.82 25286.386.3845 29.21860477 284.5264 374.63463 374.201239 6.76 19	0.56			284		6.72	18.28	5.68	1087.45	8.04
25340_28372 2918099276 284_9252 3750_888493 6.76 19.37 8.70 25340_28372 29110841609 284_9564 3832_502751 6.63 19.16 11.84 25340_80826 294_19504 3832_502751 6.63 19.29 14.16 2533_33_20032 29_1186370 284_8337 3745_29454 6.76 19.29 14.16 2529_271301 29_11967274 284_1767 376_509924 6.76 19.27 33.84 2529_2713101 29_11867255 284_1767 376_509924 6.76 19.27 14.37 2529_2713101 29_11860277 284_1864 377_5.24584 6.76 19.27 14.35 2528_272_77801 29_2860437 374_5.291234 6.76 19.27 14.35 2526_734663 29_22864344 374_5.291234 6.76 19.27 107.82 2526_734663 29_2286444786 374_5.901239 6.75 19.27 107.82 2526_73463 29_135660 285_369 427_63463 5.96	0.57			284			18.87	6.74	1043.40	8.16
25340,80826 29,17841600 284,9504 3832,502751 6,61 19.16 11.84 25333,20032 29,1798896 284,955 3818,718018 6,63 19.29 14.16 25318,37032 29,1798896 284,8779 375,29454 6,76 19.29 23,08 25310,30413 29,1901405 284,8779 3742,29454 6,76 19.27 33,84 25208,20382 29,19627249 284,7761 3739,5957 6,76 19.24 46,37 25228,71301 29,1862255 284,7761 3779,7284 6,76 19.24 46,37 25286,38445 29,2186275 284,7564 3776,30429 6,78 19.24 46,37 2528,67,34683 29,2186977 284,5644 4247,694204 6,74 20,58 20,58 2526,7,34683 29,2227303 284,5274 4247,694204 6,74 20,58 20,68 2526,7,34683 29,138,694 374,694204 6,75 19,27 107,82 2526,7,34683 29,222793 284,5	0.55			284		92.9	19.37	8.70	1130.86	8.41
25333.26022 29.179986 284.935 3818.718018 6.63 19.29 14.16 25318.7055 29.1883705 284.8377 375.038227 6.75 19.29 23.05 2528.20.30413 29.19016405 284.8377 3745.294954 6.76 19.29 23.05 2528.20.71301 29.19027249 284.7761 3739.90924 6.75 19.14 46.37 2528.20.71301 29.18627256 284.7761 375.537234 6.79 19.44 63.28 2528.6.38445 29.2180977 284.5634 3775.537234 6.79 19.93 7745 25280.60839 29.2180977 284.5634 3775.537234 6.75 19.27 107.82 25267.34639 29.22860487 284.764 4247.634363 5.96 20.08 92.59 25207.3478 29.12860487 284.554 472.18894 5.46 18.42 11.22 25207.3463 29.12860487 284.344 472.18894 5.46 18.42 11.52 2580.2734.8274 29.	0.60			,		6.61	19.16	11.84	1322.35	8.75
25318.7955 29.18583705 284.8779 3753.038527 6.75 19.42 1740 25310.30413 29.19610405 284.837 3745.294954 6.76 19.29 23.05 25208.20382 29.19627249 284.7761 3739.9397 6.76 19.24 46.37 25208.271301 29.19822555 284.7567 3765.90924 6.79 19.14 46.37 25286.38445 29.2180277 284.4786 3746.994204 6.74 19.29 46.37 25280.60839 29.2180977 284.4786 3742.901239 6.75 19.27 107.82 25267.54693 29.2280.60839 29.222734 6.79 19.27 107.82 25267.54693 29.2280.60839 29.2280.60839 29.2280 6.75 19.27 107.82 25267.54693 29.2280.60839 28.5391 4247.634363 5.96 20.00 20.28 25267.54693 29.2227303 284.527 3742.901239 5.46 19.27 107.82 2580.5277.344 29.1366912	0.62						19.29	14.16	1452.19	8.91
25310.30413 29.19016405 284.8357 3745.294954 6.76 19.29 23.05 25298.20382 29.19627249 284.7761 3739.9597 6.76 19.27 33.84 25292.7131 29.19627254 284.7756 3765.90924 6.76 19.27 33.84 25286.38445 29.21862255 284.758 3779.72881 6.79 19.34 63.28 25280.60839 29.2180977 284.5634 3775.53723 6.79 19.37 107.82 25280.586.6893 29.2227303 284.5227 3742.901239 6.75 19.27 107.82 25267.54693 29.22227303 284.5227 3742.901239 6.75 19.27 107.82 2581.2860.57344 29.136072 285.3649 4723.18894 5.66 19.27 107.82 25801.2794.7945 29.1380721 285.3449 4788.73922 5.09 19.25 13.41 25786.796.7953 29.1860568 285.349 478.87392 5.03 19.25 22.26 25786.7467	0.62			` '		6.75	19.42	17.40	1609.91	9.13
25298.20382 29.19627249 284.7761 3739.9597 6.76 19.27 33.84 25292.71301 29.1982555 284.7567 3765.909924 6.72 19.14 46.37 25292.71301 29.1982555 284.7567 3765.909924 6.72 19.14 46.37 25280.60834 29.21682255 284.5578 3779.72681 6.69 19.44 63.28 25280.60834 29.2168047 284.5527 3742.901239 6.75 19.27 107.82 25267.54693 29.222680487 284.4786 3746.994204 6.75 19.27 107.82 25267.54693 29.22227303 284.5227 3742.901239 6.75 19.27 107.82 25267.54693 29.2222730 284.5264 4247.634363 5.67 18.42 1.22 2580.2567.54693 29.136604 285.3391 4552.759129 5.46 18.53 2.06 2580.25734 29.1380721 285.3494 4778.873923 5.18 19.41 3.91 25776.75766	0.64			284	3745.294954	92.9	19.29	23.05	1925.68	9.49
25292.71301 29.1982556 284.7567 3765.909924 6.72 19.14 46.37 25286.38445 29.21682255 284.5758 3779.72681 6.69 19.44 63.28 25280.60839 29.2188077 284.5634 3779.72681 6.76 19.93 77.45 25270.77807 29.2280487 284.5634 3776.991239 6.75 19.27 107.82 25270.77807 29.2227303 284.5227 3742.901239 6.75 19.27 107.82 25267.54693 29.2227303 284.5227 3742.901239 6.75 19.27 107.82 25267.27403 29.12660119 285.4564 4247.634363 5.67 18.42 1.22 25801.2794 29.133688 285.3931 4552.759129 5.67 18.53 2.06 25801.27945 29.1380721 285.3449 4778.73923 5.18 19.41 3.91 25778.6776 29.1860568 285.354 476.808272 5.18 19.24 34.08 25778.15153 29.1865667	0.67			284	3739,9597	92.9	19.27	33.84	2359.23	9.78
25286.38445 29.1682255 284.5758 3779,72681 6.69 19.44 63.28 25280.60839 29.2180977 284.5634 3775,537234 6.70 19.93 77.45 25280.60839 29.2280488 284.4786 3746,994204 6.75 19.93 77.45 25267.277807 29.22680487 284.4786 3746,994204 6.75 19.27 107.82 25267.277807 29.226048 284.5227 3742,901239 6.75 19.27 107.82 25267.277807 29.12669119 285.3454 4247,634363 5.06 20.00 19.24 12.2 2580.27784 29.1380721 285.3449 4723,18824 5.18 18.53 1.52 25796.79204 29.1380721 285.3449 4788,13923 5.18 19.41 3.91 25796.79204 29.1586068 285.1541 4980.823181 5.18 19.24 6.12 25706.15156 29.1680696 285.1541 4980.823181 5.18 19.24 43.08 25718.748.23	0.69		_	284		6.72	19.14	46.37	2930.84	10.17
25280.60839 29.2180971 284.5634 3775.537234 6.70 19.93 77.45 25272.77807 29.22680487 284.4786 3746.994204 6.74 20.58 92.59 25267.24693 29.2227303 284.5227 3742.901239 6.75 19.27 107.82 25223.53453 29.2227303 284.524 4247.634363 5.96 20.00 107.82 2581.2847 29.135608 285.364 4247.634363 5.67 18.42 1.22 25809.5734 29.135608 285.3331 4552.759129 5.46 18.53 1.52 25801.27945 29.1360721 285.3449 4723.18894 5.46 18.53 1.52 25801.27945 29.136667 285.1541 498.823181 5.18 19.41 3.91 25706.7805763 29.1866576 285.1541 498.823181 5.03 19.25 22.26 25718.67437 29.18859127 284.854 5216.390563 4.93 19.04 43.68 25706.5941 29.2246321	0.73			284		69.9	19.44	63.28	3584.73	10.53
25272.77807 29.2680487 284.4786 3746.994204 6.74 20.58 92.59 25267.54693 29.2227303 284.5227 3742.901239 6.75 19.27 107.82 25323.53453 29.2227303 284.5227 3742.901239 6.75 19.27 107.82 25814.28275 29.13669119 285.369 4247.634363 5.67 18.42 1.22 25809.57344 29.138602 285.369 4723.18894 5.46 18.53 2.06 25801.27945 29.1380721 285.369 4723.18894 5.46 18.53 2.06 25801.27946 29.1380721 285.349 4788.73923 5.38 18.53 2.06 25801.27946 29.1380721 285.3449 4788.73923 5.18 19.41 3.91 25778.6576 29.15806686 285.051 490.8823181 5.18 19.21 6.12 25778.6576 29.16806968 285.051 284.9549 5120.118309 5.03 19.24 34.08 25736.748.2301	0.74					6.70	19.93	77.45	4052.81	10.79
25267.54693 29.2227303 284.5227 3742.901239 6.75 19.27 107.82 25323.53453 29.12669119 285.4564 4247.634363 5.96 20.00 1.22 25814.28275 29.13314839 285.369 4752.759129 5.67 18.42 1.22 25809.57344 29.1380721 285.349 4788.73923 5.39 18.53 2.06 25801.27945 29.1380721 285.349 478.873923 5.39 18.53 2.06 25801.27945 29.1380721 285.3449 478.873923 5.18 19.41 3.91 25796.79204 29.15045514 285.237 4976.808272 5.18 19.41 3.91 25778.6576 29.15786667 285.1541 4980.823181 5.18 19.25 22.26 25778.6576 29.16806968 285.0514 5060.800233 5.09 19.25 13.41 25778.6715 29.18859127 284.851 5216.390563 4.93 19.34 43.08 25708.768.7184 29.2246321<	0.75			284.4786		6.74	20.58	92.59	4462.56	10.99
25323.53453 29.12669119 285.4564 4247.634363 5.96 20.00 25814.28275 29.1314839 285.3931 4522.759129 5.67 18.42 1.22 25809.57344 29.135608 285.369 4723.18894 5.46 18.53 1.52 25801.27945 29.1380721 285.349 478.73923 5.39 18.53 2.06 25706.79204 29.1380721 285.327 4976.808272 5.18 19.41 3.91 25706.79204 29.15756667 285.1541 4980.823181 5.18 19.41 3.91 25778.65769 29.1575667 285.1541 4980.823181 5.09 19.25 9.25 25748.23011 29.16806968 285.0514 5060.800233 5.03 19.25 9.25 25748.23011 29.1795479 284.851 5216.390563 4.93 19.04 34.08 25736.748.331 29.188659127 284.6844 5274.576775 4.87 19.54 43.55 25708.768383 29.20547034 284.5	0.77			284	3742.901239	6.75	19.27	107.82	4847.14	11.12
25323.53453 29.12669119 285.4564 4247.634363 5.96 20.00 2523.53453 25814.28275 29.13314839 285.369 4723.18894 5.67 18.42 1.22 25809.57344 29.135608 285.369 4723.18894 5.46 18.53 1.52 25801.27945 29.1380721 285.3449 4788.73923 5.39 18.53 2.06 25801.27945 29.15045514 285.237 4976.808272 5.18 19.41 3.91 25706.79204 29.1575667 285.1541 4980.823181 5.18 19.41 3.91 25778.65769 29.1575667 285.1541 4980.823181 5.09 19.25 9.25 25748.23011 29.16806968 285.0514 5060.800233 5.03 19.25 9.25 25748.23011 29.18859127 284.851 5216.390563 4.89 19.04 34.08 25723.51203 29.19861571 284.6522 5342.857184 4.87 19.54 43.55 25700.5941 29.224632										
25814,28275 29.13314839 4552,759129 5.67 18.42 1.22 25809,57344 29,1380721 285.369 4723,18894 5.46 18.53 1.52 25801,27945 29,1380721 285,3449 4788,73923 5.39 18.53 2.06 25801,27945 29,1380721 285,234 4976,808272 5.18 19.41 3.91 25706,79204 29,15045514 285,234 4976,808272 5.18 19.41 3.91 25778,6750 29,1576667 285,1541 4980,823181 5.08 19.31 6.12 25748,23011 29,16806968 285,054 5060,800233 5.03 19.25 9.25 25748,23011 29,1785479 284,9549 5120,118309 5.03 19.25 13.41 25736,743,73 29,18859127 284,854 5216,390563 4,93 19.64 43.68 25708,763,83 29,20847094 284,6864 5274,576775 4,81 19.91 70.96 25707,03194 29,2246321 284,5622 </td <td>0.46</td> <td></td> <td></td> <td>285</td> <td></td> <td>5.96</td> <td>20.00</td> <td></td> <td>4377.68</td> <td>5.97</td>	0.46			285		5.96	20.00		4377.68	5.97
25809.57344 29.135608 285.369 4723.18894 5.46 18.53 1.52 25801.27945 29.1380721 285.3449 4788.73923 5.39 18.53 2.06 25706.79204 29.1380721 285.3449 478.73923 5.18 19.41 3.91 25778.65769 29.15756667 285.1541 4980.823181 5.18 19.31 6.12 25778.65769 29.16806968 285.0514 5060.800233 5.09 19.25 9.25 25761.51536 29.16806908 284.9549 5120.118309 5.03 19.25 9.25 25748.23011 29.19861571 284.9549 5120.118309 5.03 19.04 34.08 25723.51203 29.19861571 284.7532 5265.548344 4.81 19.04 34.08 25708.768383 29.20547094 284.6864 5274.576775 4.87 19.54 43.55 25707.03194 29.2246321 284.4997 5428.400955 4.74 19.91 70.96	0.48	!		(4)	4552.759129	5.67	18.42	1.22	2418.28	6.70
25801.27945 29.1380721 285.3449 4788.73923 5.39 18.53 2.06 25796.79204 29.15045514 285.2237 4976.808272 5.18 19.41 3.91 25778.65769 29.15756667 285.1541 4980.823181 5.18 19.31 6.12 25778.65769 29.1576667 285.0514 5060.800233 5.09 19.25 9.25 25748.23011 29.17696968 285.0514 5060.800233 5.03 19.25 9.25 25748.23011 29.17795479 284.9549 5120.118309 5.03 19.36 22.26 25736.74373 29.18859127 284.851 5216.390563 4.89 19.04 34.08 25708.76383 29.20547094 284.6864 5274.576775 4.87 19.54 43.55 25708.76394 29.2246321 284.4997 5428.400955 4.74 19.91 70.96 25707.03194 29.2246321 284.4997 5428.400955 4.74 19.91 70.96	0.50			28		5.46	18.53	1.52	1884.72	6.97
25796.79204 29.15045514 285.2237 4976.808272 5.18 19.41 3.91 25778.65769 29.15756667 285.1541 4980.823181 5.18 19.31 6.12 25778.5761.51536 29.16806968 285.0514 5060.800233 5.09 19.25 9.25 25748.23011 29.1795479 284.9549 5120.118309 5.03 19.25 13.41 25736.74373 29.18859127 284.851 5216.390563 4.93 19.04 34.08 25736.74373 29.19861571 284.854 5265.548344 4.89 19.04 34.08 25708.76383 29.20547094 284.6864 5274.576775 4.81 20.06 56.30 25706.5941 29.21821238 284.4997 5428.400955 4.74 19.91 70.96 25707.03194 29.2246321 284.4997 5428.400955 4.74 19.91 70.96	0.51		- 1	285		5.39	18.53	2.06	1614.41	7.12
25778.65769 29.15756667 285.1541 4980.823181 5.18 19.31 6.12 25761.51536 29.16806968 285.0514 5060.800233 5.09 19.25 9.25 25748.23011 29.1795479 284.9549 5120.118309 5.03 19.25 13.41 25736.74373 29.18859127 284.851 5216.390563 4.93 19.04 34.08 25723.51203 29.19861571 284.7532 5265.548344 4.89 19.04 34.08 25708.76383 29.20547094 284.6864 5274.576775 4.81 20.06 56.30 25706.5941 29.21821238 284.5622 5342.857184 4.81 20.06 56.30 25707.03194 29.2246321 284.4997 5428.400955 4.74 19.91 70.96	0.54			285		5.18	19.41	3.91	1363.10	7.79
25761.51536 29.16806968 285.0514 5060.800233 5.09 19.25 9.25 25748.23011 29.17795479 284.9549 5120.118309 5.03 19.25 13.41 25748.23011 29.18859127 284.851 5216.390563 4.93 19.36 22.26 25723.51203 29.18859127 284.851 5265.548344 4.89 19.04 34.08 25723.51203 29.19861571 284.6864 5274.576775 4.87 19.54 43.55 25708.76383 29.20547094 284.5622 5342.857184 4.81 20.06 56.30 25706.5941 29.2246321 284.4997 5428.400955 4.74 19.91 70.96	0.56			285	4980.823181	5.18	19.31	6.12	1366.62	8.07
25748.23011 29.17795479 284.9549 5120.118309 5.03 19.25 13.41 25736.74373 29.18859127 284.851 5216.390563 4.93 19.36 22.26 25723.51203 29.19861571 284.7532 5265.548344 4.89 19.04 34.08 25708.76383 29.20547094 284.6864 5274.576775 4.81 20.06 56.30 25706.5941 29.21821238 284.5622 5342.857184 4.74 19.91 70.96 25707.03194 29.2246321 284.4997 5428.400955 4.74 19.91 70.96	0.61	j		285	5060.800233	5.09	19.25	9.25	1575.82	8.57
25736.74373 29.18859127 284.851 5216.390563 4.93 19.36 22.26 25723.51203 29.19861571 284.7532 5265.548344 4.89 19.04 34.08 25703.51203 29.20547094 284.6864 5274.576775 4.87 19.54 43.55 25706.5941 29.21821238 284.5622 5342.857184 4.74 19.91 70.96 25707.03194 29.2246321 284.4997 5428.400955 4.74 19.91 70.96	0.63			284	5120.118309	5.03	19.25	13.41	1875.61	9.02
25723.51203 29.19861571 284.7532 5265.548344 4.89 19.04 34.08 25708.76383 29.20547094 284.6864 5274.576775 4.87 19.54 43.55 25706.5941 29.21821238 284.5622 5342.857184 4.81 20.06 56.30 25707.03194 29.2246321 284.4997 5428.400955 4.74 19.91 70.96	99.0	- 1	3 29.18859127	284.851	5216.390563	4.93	19.36	22.26	2432.12	9.46
25708.76383 29.20547094 284.6864 5274.576775 4.87 19.54 43.55 25706.5941 29.21821238 284.5622 5342.857184 4.81 20.06 56.30 25707.03194 29.2246321 284.4997 5428.400955 4.74 19.91 70.96	0.69		3 29.19861571	284	5265.548344	4.89	19.04	34.08	3167.15	10.05
25706.5941 29.21821238 284.5622 5342.857184 4.81 20.06 56.30 25707.03194 29.2246321 284.4997 5428.400955 4.74 19.91 70.96	0.72		3 29.20547094	284	5274.576775	4.87	19.54	43.55	3620.30	10.34
25707.03194 29.2246321 284.4997 5428.400955 4.74 19.91 70.96	0.75		$\overline{}$	284.	5342.857184	4.81	20.06	56.30	4205.11	10.62
	0.76			284.4997	5428.400955	4.74	16.61	70.96	4726.33	10.85

					CO (ppmV)	2563.84	2276.13	1944.95	1745.79	1644.90	1616.48	1590.10	1588.99	1630.99	1681.37	1879.65	2164.22	2258.33	2541.87	2861.05	3137.46	3572.54	3987.31	4387.16	4792.65	4875.48		
					O (Amaa) xON	.12	1.96	2.59	1.91	4.04	4.43	4.48	5.50	99.9	8.27	89.6	12.98	15.11	18.24	23.45	28.65	35.54	41.55	48.79	57.83	63.99		
					Vaporizer (C)	19	57.79	57.65	56.78	56.05	56.55	55.79	55.94	55.39	55.58	55.62	54.27	55.11	54.91	54.14	53.78	52.89	53.67	53.02	53.46	52.07		
					Tau (ms)	96'9	86'9	7.04	7.06	7.05	7.06	7.08	7.21	7.23	7.25	7.29	7.15	7.21	7.22	7.27	7.27	7.31	7.39	7.30	7.34	7.36		
					<u> </u>	3598.188235	3588.342965	3554.617129	3538.323046	3544.297251	3536.797326	3525.222547	3462.527898	3449.876377	3438.301502	3417.216265	3483.213013	3455.224811	3448.546695	3425.308791	3420.134462	3401.511903	3362.714653	3403.823893	3385.971771	3376.969453		
						280.1225927	279.9466747	279.6891799	279.4615201	279.3278213	279.2043809	279.0482632	278.8344128	278.6873073	278.5797437	278.2289539	277.9640368	277.8493933	277.6355158	277.3858619	277.22342	277.0221852	276.7130157	276.548169	276.3613164	276.3117014		
					2	29.68129032	29.69942	29.72728513	29.7515021	29.76574249	29.77890237	29.79556262	29.81841415	29.83415385	29.84567323	29.88330252	29.91178318	29.92412508	29.94717724	29.97413041	29.99169406	30.01348067	30.04701451	30.06492515	30.08525255	30.09065472		
					A	5043.53727	25028.94317	25010.7048	24996.86983	24986.98476	24977.31933	24969.04374	24951.90658	24941.4313	24933.32385	24918.56232	24915.45835	24906.5479	24896.45455	24886.7421	24878.18375	24868.58981	24857.15735	24853.9739	24845.78781	24840.57207		
Table 10		1000		 n-Heptane Data	P I ah (Pa)	9161	99148	99135	99122	99109	96066	68066	02066	75066	99043	99030	99017	99004	16686	82686	59686	98952	68636	98626	98913	00686		

	IV) CO (ppmV)	36		7	6.5161628 2088.128663				24.7279296 3457.558598			51.8168985 5080											
	NOx (ppmV)			3			13.80015624	19.31249992			42.01110775												
	Vaporizer (C)		51.33	52.48	53.85		53.54	53.20	52.37	53.19	54.92	52.61								-			
	Tau (ms)	5.53	5.16	5.48	5.47	5.46	5.55	5.51	5.55	5.58	5.56	2.60									-		
	В	4674.587902	5025.820495	4712.859838	4718.190991	4728.440525	4644.471346	4674.248842	4638.487865	4610.375171	4625.020883	4586.125995											
		280.0022176	279.8219305	279.6479283	279.0486913	278.9143068	278.2439601	277.9184416	277.683168	277.2349374	277.063943	276.6601333											
	R	29,69405054	29.71318218	29.73167028	29.79551691	29.80987277	29.88169086	29.91669049	29.94203812	29.9904481	30.00895717	30.05275788											
•	A	25860.00415	25922.63694	25834.87896	25813.2125	25801.30135	25762.53154	25743.71564	25731.55017	25709.68036	25703.8928	25691.4279											
n-Heptane Data	P Lab (Pa)	101800	101800	101800	101800	101800	101800	101800	101800	101800	101800	101800											

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Mothern Date								
Methane Data								
P lab (Pa)	A	M	R	В	Tau (ms)	Vaporizer (C)	NOx (ppmV)	CO (ppmV)
99574	25128.00691	28.26512606	294.1575418	3458.581965	7.27	17.92	2.14	3570.59
99582	25115.9423	28.23264286	294.4959862	3489.773914	7.20	18.15	69.0	2701.35
99591	25104.05941	28.20476533	294.7870654	3466.798899	7.24	17.82	1.10	2270.14
99565	25090.3157	28.17940021	295.0524119	3507.523508	7.15	18.03	3 2.01	1800.16
99556	5 25078.38815	28.15542192	295.3036905	3486.52641	7.19	18.11	5.22	1632.89
99547	75066.57797	28.13378129	295.5308394	3476.669526	7.21	18.65		1517.79
99538	3 25052.09982	28.12361148	295.6377066	3427.166024	7.31	18.92	5.37	1517.15
99529	25043.00578	28.1087059	295.7944784	3385.46248	7.40	18.68	6.49	1535.12
99521	25034.4977	28.07888183	296.1086574	3374.070249		18.81	1 8.80	1642.21
99512	25032.84955	28.06094994	296.2978808	3419.56762	7.32		7 11.44	1775.02
99503	3 25024.45293	28.02985455	296.6265839	3438.292468		18.70	15.03	2114.79
99494	1 25014.78746	28.00577623	296.8816123	3416.48789	7.32	18.81	19.50	2461.38
99485	5 25004.37273	27.97372312	297.2217879	3372.030817	7.42	18.71	1 23.38	2718.44
99476	5 25002.68595	27.95483344	297.422627	3431.770842	7.29	18.68	3 28.72	3250.19
99468	3 24989.48486	27.91040984	297.8960198	3386.209378	7.38	18.72	39.52	4150.89
99459	24987.97784	27.88323553	298.1863418	3430.843443	7.28	18.51	1 43.29	4627.36
99450	0 24978.38371	27.87757746	298.246862	3367.215793	7.42	18.84	49.92	4879.25
100500	0 25487.03118	28.21808797	294.6478871	4206.943483	6.06	17.58	8 0.20	4309.36
100500	0 25468.32522	28.20572092	294.7770782	4198.81045		17.19	9 1.04	
100500	0 25427.87165	28.17110793	295.1392619	4173.680611	6.09	16.67		
100500	0 25431.75782	28.16116299	295.2434884	4222.828814	6.02	16.83	3 5.57	2255.80
100500	0 25393.70143	28.14967374	295.3639916		6.27	16.35	5 5.41	
100500	0 25385.14943	28.13500239	295.5180129			16.24	4.96	
100500	0 25369.98645	28.10354505	295.8487972	4016.859098	6.32		2 8.57	
100500	0 25354.59351	28.08557258	296.0381162	3949.612353		16.28	8 11.06	1862.91
100500	0 25338.90552	28.05168852	296.3957051	3900.353197	6.50	16.12	2 10.65	2002.02
100500	0 25325.14972	28.01500749	296.7837864	3888.280333	6.51	16.22	14.35	2349.18
100500	0 25320.87226	27.98528525	297.0989906	3925.161325	6.45	15.92	20.32	
100500	0 25308.06831	27.97119344	297.2486683	3823.159336	6.62	15.95	5 20.86	2822.67
100500	0 25308.91687	27.9480319	297.4950089	3909.246597	6.47	15.68	8 26.22	3347.07
100500	0 25306.98012	27.92906854	297.6970029	3951.65241	6.40	15.93	33.05	3936.19

	CO (ppmV)	3787.11	2738.56	2326.97	1967.86	1861.87	1832.05	1846.26	1867.53	1969.63	2240.32	2453.63	2651.61	3169.00	3524.66	3975.84	4385.07	4557.40	4857.79	4842.01	5015.93						
	NOx (ppmV)		0.00	0.00	90.0	0.23	0.38	1.51	3.71	4.39	66.9	14.56	20.67	26.80	32.81	39.48	51.58	56.43	09.59	82.99	76.30						
	Vaporizer (C)	28	53.16	52.39	51.78	53.67	53.02	53.49	52.09	52.16	51.20	51.74	50.88	51.48	49.71	50.26	50.01	49.52	49.25	49.50	50.43						
	Tau (ms)	7.56	6.92	86.9	6.97	6.94	86.9	7.02	7.32	7.34	7.38	7.45	7.50	7.53	7.59	7.55	7.59	7.53	7.53	7.57	7.57						
	B	3321.402551	3733.785861	3702.029273	3705.569617	3718.163359	3697.368169	3673.028231	3516.433997	3510.036276	3488.321157	3453.0727	3427.803134	3417.117766	3388.648711	3403.508101	3386.211136	3414.410714	3412.047794	3394.756473	3393.129045						
		280.4432006	279.8723607	279.6097665	279.349416	279.1953563	279.0571758	278.8357284	278.6294306	278.4713039	278.1898104	277.9259684	277.7304223	277.3167787	277.1165711	276.8170803	276.600743	276.5541756	276.377819	276.2934864	276.1600396						
	R	29.64735811	29.70782816	29.73572814	29.76344149	29.77986493	29.794611	29.81827346	29.84035097	29.85729546	29.88750734	29.91588029	29.93694365	29.98159735	30.00325808	30.03571886	30.05921065	30.06427215	30.08345616	30.09263848	30.10717992						
	A	25112.7913	25838.3296	25824.15056	25810.20428	25802.09982	25794.11661	25784.76369	25755.44304	25749.5108	25740.23332	25731.06873	25724.4389	25717.85823	25712.57127	25710.60976	25705.45799	25706.42686	25702.35936	25699.32177	25696.34462						
Toluene Data	P lab (Pa)	00566	102300	102300	102300	102300	102300	102300	102300	102300	102300	102300	102300	102300	102300	102300	102300	102300	102300	102300	102300						

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Ethylbenzene data	data							
P lab (Pa)	A	M	R	В	Tau (ms)	Vaporizer (C)	NOx (ppmV)	CO (ppmV)
99500		29.70579983	279.8914706	3364.232806	7.46	53.93	5.36	2695.95
100700		29.71937346	279.7636367	3463.669962	7.34	55.44	1.13	2361.67
100700		29.7330713	279.6347514	3437.568947	7.39	55.00	0.75	2149.83
99500		29.73600386	279.6071738	3406.923864	7.37	54.78	0.38	2053.52
99500	7	29.74337462	279.5378838	3447.34831	7.28	57.26	1.14	1925.28
100700		29.75484233	279.4301481	3476.881849	7.30	57.09	0.85	1858.60
100700	25385.88662	29.77522887	279.2388276	3467.289328	7.32	56.09	1.33	1720.18
99500		29.7772468	279.2199042	3415.895093	7.34	55.10	0.94	1705.42
100700	25373.99973	29.79700392	279.0347655	3440.575554	7.37	55.97	3.17	1633.47
100700	25369.00176	29.80854461	278.9267343	3433.344882	7.39	55.02	3.66	1607.59
99500		29.81528183	278.8637064	3407.151592	7.36	54.61	2.92	1643.72
100700	25356.80214	29.84272391	278.6072754	3418.860762	7.42	56.59	3.81	1647.36
99500	7	29.85086492	278.5312928	3387.082549	7.40	54.84	4.92	1696.17
100700		29.86989759	278.3538168	3398.577044	7.46	55.43	7.92	1724.00
100700	25	29.87856041	278.2731124	3403.034485	7.45	60.12	5.79	1746.88
99500		29.89750589	278.0967761	3394.908792	7.38	54.87	9.05	1939.23
100700		29.90935292	277.9866225	3446.494061	7.35	55.57	10.51	1978.49
99500	_	29.92508967	277.8404373	3372.87231	7.42	54.91	12.42	2167.11
100700		29.94211137	277.6824886	3421.306085	7.40	54.89	13.59	2232.11
100700		29.96913811	277.4320693	3397.138672	7.45	55.23	15.93	2483.72
99500		29.97804876	277.3496056	3328.018918	7.52	53.92	17.52	2621.22
99500		29.98844693	277.2534376	3361.880996	7.44	54.10	21.97	2827.99
99500		29.99795448	277.1655649	3388.300702	7.38	53.92	24.15	2979.56
100700	7	30.02074036	276,955195	3307.474307	7.65	57.67	26.38	2986.08
100700		30.04847967	276.6995232	3375.479191	7.50	54.35	35.54	3581.27
100700		30.07084015	276.4937713	3333.884695	7.59	53.87	40.46	3834.20
99500	- 1	30.07497537	276.4557542	3330.719658	7.51	52.73	45.24	4127.74
100700		30.08307918	276.3812823	3375.121468	7.50	53.55	46.61	4156.90
99500		30.10300241	276.1983634	3325.918028	7.51	52.88	57.48	4712.86
100700	25290.37988	30.13281195	275.9251282	3342.293591	7.57	54.01	66.43	4865.59

		CO (ppmV)	2797.76	2747.30	2393.42		2291.73	2333.83			3058.39	3481.95											
		NOx (ppmV)	0.63	2.04	2.20	1.98	1.59	3.41	5.41	9.28	13.03	20.83											
		Vaporizer (C)	59.87	60.51	59.82	60.15	60.13			59.84	59.23	60.43											
		Tau (ms)	5.49	5.45	5.42	5.32	5.28	5.24	5.24	5.29	5.31	5.29											
		B	4604.695129	4647.241478	4667.191112	4751.256643	4787.080599	4818.611587	4812.525519	4771.731234	4747.655633	4764.286255											
		1	279.698086	279.6107712	279.375757	279.1701033	278.8515391	278.5711023	278.2046608	277.9216374	277.6412167	277.2330753											
		R	29.72633857	29.73562129	29.76063524	29.78255874	29.81658279	29.84659906	29.88591196	29.91634649	29.94656233	29.99064953											
dota	ala	A	25300.43947	25304.26495	25289.64123	25289.90755	25272.21248	25259.58469	25238.79236	25220.46522	25204.05897	25185.29656											
Tehulbonzone data	Euryibenzene d	P lab (Pa)	9500	99500	99500	99500	99500	99500	99500	99500	99500	99500											

Table 14

Cyclohexane data	ata							
P Lab (Pa)	A	M	R	В	Tau (ms)	Vaporizer (C)	NOx (ppmV)	CO (ppmV)
00266		29.62337352	280.6702617	3687.166894	6.83	51.45		2390.34
100850		29.58039048	281.0781016	3479.728456	7.32	53.63	0.71	4059.19
100866		29.59190438	280.968737	3530.266403	7.22	53.64	1.04	3166.24
100882		29.60241168	280.8690079	3524.302279	7.23	52.50		2609.32
100898	- 1	29.61819337	280.7193503	3540.359502	7.20	54.45	1.51	2038.94
100914	25457.46014	29.64003261	280.5125119	3503.171506	7.27	54.16	2.12	1498.88
100930	25440.3985	29.66227462	280.302172	3426.582018	7.42	53.57	2.82	1258.88
100945	25439.0273	29.67342043	280.196886	3425.326456	7.43	53.21	3.34	1205.55
100961		29.68695074	280.0691817	3363.637817	7.56	54.02	4.22	1142.68
100977		29.71031735	279.8489125	3329.552217	7.64	51.72	5.30	1152.38
100993		29.73977633	279.5717059	3309.158042	2.68	52.53	7.40	1245.18
101009	25413.54818	29.75483862	279.430183	3306.255257	69.7	51.05	9.13	1341.82
101025	25408.57042	29.7777087	279.2149902	3268.747618	7.77	51.37	10.71	1432.54
101041	25412.80807	29.81613501	278.8557268	3357.545284	7.57	50.72	15.34	1761.48
101057	25411.32558	29.83398698	278.6888661	3350.601061	7.58	50.48	19.00	1964.40
101073	25410.90898	29.8507837	278.5320508	3359.168185	7.56	51.90	23.67	2205.24
101089	25408.54672	29.87195861	278.3346117	3337.220359	7.61	51.07	28.48	2451.91
101105	25410.48017	29.88552111	278.2082993	3336.708739	7.62	50.85	31.27	2593.35
101120	(1)	29.90407612	278.0356754	3336.703187	7.62	51.70	37.94	2926.29
101136	- 1	29.92902771	277.8038793	3355.827137	7.57	50.37	44.53	3260.38
101152		29.9454958	277.651105	3394.452155	7.49	51.23	51.51	3570.52
101168		29.95436261	277.5689174	3403.426079	7.47	50.05	55.66	3720.54
101184	25	29.97116369	277.4133192	3403.317768	7.47	49.18	65.05	4056.10
101200	25415.476	30.00523321	277.0983295	3372.373211	7.54	49.14	78.88	4558.44

Table 14 cont

Cyclobezane data M A A A Cyclobezane data Cyclobeza	Table 14	COILL							
A	ohexane da	ıta							
5600 23206.16605 29 6211976 280 6908791 4410.866177 5.74 5.8.70 5601 23512.18781 226.4948688 280.41900012 5.51 58.94 5601 23513.18781 226.49491688 280.01907635 4741.146141 5.34 60.81 5602 23513.11304 29.7182837 279.7181822 478.740046 5.29 58.90 5603 23513.811904 20.738563317 279.7181822 474.1146141 5.34 60.81 5603 23574.30054 20.788536337 279.7181822 474.1146141 5.34 60.02 5603 23574.30054 20.788536337 279.7181822 474.1146141 5.44 60.02 5604 23574.2005 278.83560337 278.83563377 279.8356377 59.93 59.83 5650 23526.086047 20.88970269 277.5092057 494.8633179 5.10 59.83 5650 2352.28.15554 20.99007861 277.5092057 494.8633179 5.10 60.49 5650					В	Tau (ms)	Vaporizer (C)	NOx (ppmV)	CO (ppmV)
25311.31881 29 64988808 2804 4196493 4594,000012 5.54 60.81 25311.31367 22 0.1037635 4741.146141 5.34 60.81 60.81 25311.31304 29 7188377 279.188182 4741.146141 5.34 60.81 25311.31304 29 7188397 279.18811 480.4061566 5.20 58.00 25311.31304 29 7188397 496.829833 5.10 60.02 5.22 2520.65807 29 84522532 279.14811 480.600756 5.13 57.70 2520.65807 29 84522532 278.8107054 4923.654577 5.13 57.98 2520.65807 29 84522532 278.4407827 5.13 57.98 5.18 2520.65807 29 84522532 278.440781 5.07 58.84 5.18 25228.15281 29 92133909 277.875264 498.03179 5.07 57.86 25219.18475 29 96080789 277.594125 494.633179 5.10 60.49 25219.18475 29 96080789 277.59408 494	9650	25306.16605	29.62119762	280.6908791	4410.866177	5.74	58.70		2294.02
25314.53067 29.68264975 280.1097655 471.146141 5.34 60.81 25315.11304 29.71782337 279.71781223 4785.740046 5.29 58.70 25315.81094 29.77836393 279.1781224 4964.828837 5.10 60.02 2528.950105 29.78536393 279.143811 4964.828837 5.13 57.70 2528.450054 29.88556242 278.6770547 5.13 57.70 58.40 2526.058034 29.8850025 27.86770549 4924.67311 5.03 59.18 2524.76014 29.88970699 27.878.055042 4924.67311 5.03 58.31 2524.76014 29.9907861 27.736726 4980.045011 5.07 58.84 25228.35668 29.9007861 27.736726 4980.045011 5.07 57.86 25219.18475 29.90080789 27.736726 498.633179 5.10 60.49 25219.18476 29.90080780 27.736726 498.633179 5.10 60.49 26.600 26.600 26.600	1	25312.18781	29.64984808	280.4196493	4594.900012	5.51	58.94		1965.70
2315.11304 29.1182837 279.7781822 478.740046 5.29 58.70 2315.81094 29.75369317 279.382873131 4464.828833 5.14 60.02 22282.50105 29.7836393 279.143811 4464.828833 5.13 57.00 2520.530104 29.83820225 278.8770549 4928.037793 5.13 57.70 2520.238.1521 29.83820225 278.8739224 5.13 57.98 57.88 2522.2.76014 29.88970699 278.0856042 4924.67311 5.09 58.31 2522.2.2.51521 25.22 29.92013309 277.875264 4938.045011 5.09 58.84 252.2.8.15366 29.92007861 277.7794125 4948.033179 5.10 60.49 252.1.18475 29.96080789 277.509207 4948.633179 5.10 60.49 25.1.18475 29.96080789 277.509207 4948.633179 5.10 60.49 25.1.18478 29.96080789 277.509207 4948.633179 5.10 60.49 25.1.18478 2	1	25314.53067	29.68264975	280.1097635	4741.146141	5.34	60.81		1887.72
25.18.1094 29.7598317 279.827224 4964.829833 5.10 60.02 25.28.5.3016 22.78536393 279.143811 494.40401666 5.22 5.846 25.71.3.0016 22.7856.35323 278.404.401566 5.13 57.70 5.13 25.26.0.65807 22.845.22532 27.8.839245 4928.05477 5.13 57.78 25.260.86944 22.88980225 27.8.839245 4928.054571 5.03 59.18 25.24.76014 22.8890225 27.8.447927 5017.93271 5.03 59.18 25.228.1521 22.9.93970861 277.87264 498.046311 5.07 57.86 25.228.538.68 29.900807861 277.7794125 4972.108375 5.07 57.86 25.219.18475 29.96080789 277.509207 4948.6533179 5.10 60.49 25.219.18476 29.96080789 277.509207 4948.633179 6.049 60.49	99650	25315.11304	29.71782837	279.7781822	4785.740046	5.29	58.70		1947.55
25789-50105 29785-3033 279 143811 4840,401566 5.22 58.46 25774-30054 29.83525142 27.13 57.70 25260-86944 29.84532142 27.8.670549 5.13 57.70 25260-86944 29.8580225 27.8.670541 5.03 59.18 25260-86944 29.8870699 27.8.4479257 501.932771 5.03 58.31 25242.76014 29.8870699 27.8.856042 4954.67311 5.07 58.84 2528.1521 29.9207861 277.87264 4948.633179 5.10 60.49 25219.18475 29.96080789 277.5092057 4948.633179 5.10 60.49 25219.18476 29.96080789 277.5092067 4948.633179 5.10 60.49 26.10 20.96080789 277.5092067 4948.633179 5.10 60.49 26.10 20.96080789 277.5092067 4948.633179 5.10 60.49	99650	25315.81094	29.75989317	279.3827234	4964.829833	5.10	60.02		2234.50
25274.30054 29.8325142 27.8 6770549 49.28.030793 5.13 57.70 2526.08638/T 29.85890225 27.8.4839245 49.23.654577 5.13 57.98 2526.086944 29.8870659 27.8.1839243 27.8.11 5.09 58.31 2524.2.76014 29.8870659 27.8.185604 4954.67311 5.09 58.31 2523.8.1551 29.92133909 277.81526 496.045011 5.07 57.86 2523.8.15521 29.96080789 277.794125 4972.108375 5.00 57.86 25219.18475 29.96080789 277.794126 4948.653179 5.10 60.49 25219.18475 29.9608078 277.794126 4948.653179 5.10 60.49 26.01.49 277.509207 4948.653179 5.10 60.49 60.49 26.01.49 277.509207 4948.653179 5.10 60.49 60.49 27.1.50617 27.2.10637 27.2.10637 27.2.10637 27.2.10637 27.2.10637 27.2.10.1847 27.2.10637 27.2.	99650	25289.50105	29.78536393	279.143811	4840.401566	5.22	58.46		2381.11
25260.65807 29.84522532 278.839245 4923.654577 5.13 57.98 25260.86904 29.8580225 278.479227 5017.93271 5.03 59.18 25261.2614 29.85807699 278.479257 4017.93271 5.07 58.31 2523.815251 29.92133909 277.875264 4980.045011 5.07 58.84 25228.53668 29.95080789 277.794125 4972.108375 5.07 58.84 25219.18475 29.96080789 277.5092057 4948.633179 5.10 60.49 25219.18476 29.96080789 277.5092057 4948.633179 5.10 60.49 25219.18476 29.96080789 277.5092057 4948.633179 5.10 60.49 25219.18477 29.96080789 277.5092057 4948.633179 5.10 60.49 25219.18478 29.96080789 277.5092057 4948.633179 5.10 60.49 25219.18479 29.96080789 277.5092057 4948.633179 5.10 60.49 25219.18479 29.96080789	99650	25274.30054	29.83525142	278.6770549	4928.030793	5.13	57.70		2882.23
25260 86944 29.85980225 278.4479257 5.03 5.03 59.18 25242.76014 29.8870699 278.0856042 4954.67311 5.09 5.831 25242.76014 29.8870699 277.87264 49920.045011 5.07 5.884 25228.3368 29.90707861 277.7794125 5.10 60.49 60.49 25219.18475 29.96080789 277.5092057 4948.633179 5.10 60.49 25219.48476 29.9608078 277.5092057 4948.633179 5.10 60.49 25219.18476 29.9608078 277.5092057 4948.633179 5.10 60.49 25219.18477 29.9608078 277.5092057 4948.633179 5.10 60.49 25219.18477 29.9608078 277.5092057 4948.633179 5.10 60.49 25219.18477 29.9608078 277.5092057 4948.633179 5.10 60.49 25219.18478 29.9608078 277.5092057 4948.633179 5.10 60.49 25219.18478 29.9608078 277.5092057 4948.633179 5.10 60.49 25219.18479 29.9608078 277.5092057 4948.633179 5.10 60.49 25219.48471 29.9608078 277.5092057 4948.	05966	25260.65807	29.84522532	278.5839245	4923.654577	5.13	57.98		3111.19
25242.76014 29.89870699 278.0856042 4954.67311 5.09 58.31 25238.13251 29.9133009 277.875264 4980.045011 5.07 5.884 25228.53668 29.93007861 277.794125 4972.108375 5.07 57.86 25219.18475 29.93007861 277.794125 4948.633179 5.10 60.49 25219.18475 25.96080789 277.75092057 4948.633179 5.10 60.49 26.20 26.86080789 277.75092057 4948.633179 5.10 60.49 27.21 27.22 27.22 27.22 27.22 27.22 27.22 27.22 27.22 27.22 27.22 27.22 27.22 27.22 27.22 27.22 27.22 27.22 27.22 27.22 <t< td=""><td>99650</td><td>25260.86944</td><td>29.85980225</td><td>278.4479257</td><td>5017.932271</td><td>5.03</td><td>59.18</td><td></td><td>3799.98</td></t<>	99650	25260.86944	29.85980225	278.4479257	5017.932271	5.03	59.18		3799.98
25238.15251 29,92133909 277.875264 4980.045011 5.07 58.84 Company of the control of the con	99650	25242.76014	29.89870699	278.0856042	4954.67311	5.09	58.31		4317.23
25219.18475 29.93007861 277.794125 4972.108375 5.07 57.86 25219.18475 29.96080789 277.5092057 4948.633179 5.10 60.49 8 25219.18475 29.96080789 277.5092057 4948.633179 5.10 60.49 8 25219.18475 29.96080789 277.5092057 4948.633179 5.10 60.49 8 25219.18475 29.96080789 277.5092057 4948.633179 5.10 60.49 8 25219.18475 29.96080789 277.5092057 4948.633179 5.10 60.49 8 25219.18475 29.96080789 277.5092057 4948.633179 5.10 60.49 8 25219.18475 29.96080789 277.5092057 4948.633179 5.10 60.49 8 25219.18475 29.96080789 277.5092057 277.5092057 277.5092057 277.5092057 278.600807 278.600807 278.600807 278.600807 278.600807 278.600807 278.600807 278.600807 278.600807 278.600807 <	99650	25238.15251	29.92133909	277.875264	4980.045011	5.07	58.84		4511.63
25219.18475 29.96080789 277.5092057 4948.633179 5.10 60.49 Column 1 60.49	99650	25228.53668	29,93007861	277.794125	4972.108375		57.86		4842.98
	99650	25219.18475	29.96080789	277.5092057	4948.633179		60.49		5019.31

Table 15

R		В	Tau (ms)	Vaporizer (C)	NOx (ppmV)	CO (ppmV)
29.0008274	286.6952685	3631.261216	6.95	21.41		3885.96
29.00122548	286.6913333	3489.665256	7.29	18.92	0.67	4064.27
29.00203883	286.6832931	3551.376904	7.16	19.42	0.86	2625.57
29.00383789	286.6655107	3580.959007	7.09	19.40		1763.12
29.00530592	286.6510018	3594.144004	7.06	19.16	2.05	1309.97
29.0061262	286.6428955	3545.034088	7.16	19.35	2.58	1143.07
29.00690096	286.6352394	3488.5588	7.27	19.58		1059.75
29.00880926	286.6163835	3452.989648	7.34	19.37	4.69	1036.89
29.00960873	286.6084847	3419.630798	7.41	19.29		1067.22
29.01121037	286.5926617	3436.085522	7.37	19.50		1202.57
29.01162511	286.5885647	3410.90882	7.42	19.55	10.28	1263.62
29.01311818	286.5738163	3455.289097	7.32	19.80	13.62	1495.76
29.01357743	286.5692802	3437.164767	7.36	19.31	16.46	1648.48
29.01452774	286.5598943	3495.784498	7.24	19.75	21.09	1930.94
29.01548239	286.550466	3458.026836	7.31	19.64	24.60	2083.57
29.0173192	286.5323272	3452.915115	7.32	19.57	31.10	2425.45
29.01788688	286.5267218	3428.812009	7.37	19.72	36.74	2717.69
29.01953689	286.5104303	3456.323572	7.31	19.83	44.05	3120.65
29.02020747	286.5038098	3507.095427	7.21	19.75	53.14	3594.67
29.02169713	286.4891038	3477.356336	7.27	19.96	63.06	4061.62
29.02272489	286.4789586	3490.157476	7.24	19.88	71.24	4450.62
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TADLE								
POSF 2926 Neat data	at data							
P Lab (Pa)	A	M	R	В	Tau (ms)	Fuel Temp (C)	Vaporizer (C)	NOx (ppmV)
101100	25522.43242	29.62566956	280.6485094	3070.144258	8.31	194.43	222.75	3.36
100500	25353.35534	29.62836881	280.6229412	3182.368665	7.97	169.45	202.19	0.87
100500	25350.78203	29.6592248	280.3309951	3265.352458	7.76	177.24	203.35	1.75
100500	25343.10586	29.7112003	279.840596	3350.767258	7.56	183.66	204.38	1.34
100500	25335.19887	29.70689938	279.8811109	3320.35476	7.63	191.19	208.20	1.38
100500	25322.63872	29.74583106	279.5147993	3317.780234	7.63	196.52	209.39	2.64
100500	25312.82204	29.79463388	279.0569615	3370.232664	7.51	200.46	211.48	3.60
100500	25301.80933	29.8460612	278.5761225	3405.730356	7.43	201.53	211.70	6.25
100500	25294.68372	29.88089806	278.2513425	3425.602948	7.38	202.99	211.80	8.35
100500	25284.4371	29.89975709	278.0758377	3369.143098	7.50	203.52	211.34	98.6
100500	25275.25619	29.91304821	277.9522816	3317.942246	7.62	204.97	212.43	10.97
100500	25266.52936	29.95657968	277.5483747	3309.651251	7.63	506.69	210.71	15.11
100500		29.99051614	277.2343084	3292.722672	7.67	208.28	208.55	
100500	25250.87786	30.02081113	276.9545421	3257.991311	7.75	209.68		
100500	25242.96706	30.06701145	276.5289798	3242.766988	7.78	211.19	205.11	34.02
100500	25243.07928	30.11427153	276.0950067	3328.391336	7.58	218.02	207.10	47.71
100500	25235.21829	30.16325568	275.6466374	3299.959972		223.69	206.12	64.29
100500	25235.25364	30.17905087	275.5023687	3332.219568	7.57	230.85	208.70	72.65

		1.01	0.87	0.99	1.32	1.69	2.11	2.75	3.69	4.67	5.72	7.52	8.92	10.44	14.06	18.06	26.13	33.03	40.79	45.40	54.75	62.91	73.04				
	NOX																										
	Vaporizer (C)	135.16	132.35	133.41	133.77	133.70	132.96	133.33	131.96	130.51	129.31	129.65	129.02	128.98	127.84	127.30	126.20	125.73	127.56	126.35	126.61	126.84	126.60				
	Fuel Temp (C)	260.02	159.92	170.07	177.49	182.37	183.73	184.82	185.17	185.43	185.93	185.61	185.75	185.95	185.73	186.94	193.60	199.75	209.69	222.02	236.00	237.87	238.35				
	Tau (ms)	7.71	7.70	7.47	7.32	7.29	7.24	7.19	7.21	7.31	7.34	7.32	7.32	7.37	7.36	7.42	7.47	7.53	7.38	7.40	7.42	7.38	7.40				
	В	3294.701551	3280.401506	3378.995073	3443.499054	3455.26899	3476.772797	3500.682868	3489.990679	3439.132431	3421.706676	3428.896624	3425.854344	3402.638692	3400.777405	3371.363557	3347.502242	3317.663282	3386.357505	3374.957561	3365.324449	3379.187639	3370.19593				
		279.9522917	279.6400239	279.4558763	279.2346562	279.0624091	278.9046707	278.6716485	278.3684458	278.231101	277.996356	277.751082	277.5498241	277.3642397	277.0336015	276.7959147	276.3357147	276.0999368	275.7260565	275.5683992	275.3514973	275.0969488	274.8663077				
	R	29.6934609	29.73251069	29.75210294	29.77567367	29.79405226	29.8109027	29.83583025	29.86832784	29.88307192	29.90830571	29.93471687	29.95642323	29.97646708	30.01224384	30.03801559	30.08803986	30.1137338	30.15456756	30.1718195	30.19558667	30.22352678	30.24888743				
	M	25417.35887	25246.42518	25237.95082	25216.96551	25200.54612	25187.12238	25169.20895	25147.99916	25124.34736	25107.62858	25091.1005	25077.21403	25062.14002	25044.98888	25027.94664	25008.1521	24993.64757	24985.61454	24974.46429	24961.36236	24951.4109	24939.41407				
Table 17 Dodecane	P lab A	100600 2		- 1	I	99852.5 2	- 1	- 1	- 1	- 1					- 1			99462.5 2		99397.5 2			99300 2				

cont
17 (
Table
Η

			0.96	1.05	1.33	1.62	1.98	2.55	3.38	4.53	6.89	10.18	13.35	17.75	23.11	27.18	29.89	37.34	42.82	48.26	59.65							
		NOX	50	41	96	72	66	46	26	98	01	05	70	42	26	.64	.63	22	.73	.13	.85		-					
		Vaporizer (C)	130.50	131.41	131.96	132.72	132.99	132.46			133.01	134.05	133.70	134.42	133.97	134.64	134.63	135.22	133.73	135.13	133.85	:						
		Fuel Temp (C)	192.25	196.93	198.78	199.45	199.83	199.12	200.65	204.11	215.67	220.12	223.35	226.04	228.33	231.46	233.91	241.04	246.26	252.32	206.69							
-			6.58	6.25	6.10	5.97	5.90	5.74	2.60	5.47	5.31	5.13	5.16	5.11	5.12	5.09	5.09	5.09	5.13	5.14	5.13							
		В	3861.021386	4061.966448	4164.613679	4255.475101	4298.534866	4419.911891	4535.740322	4642.685323	4777.269271	4945.536519	4913.071497	4960.802203	4947.02589	4981.684054	4972.415712	4971.863141	4933.465543	4922.67188	4929.442443							
			279.8996856	279.5583651	279.3158141	279.1635866	278.9379676	278.7776141	278.5518984	278.3276008	277.8323446	277.4508866	277.133407	276.7521805	276.4779795	276.2656792	276.1102678	275.7691073	275.5304226	275.3318375	275.0030318							
		R	29.70492797	29.74119553	29.76702206	29.78325397	29.80734416	29.82448941	29.84865675	29.87271106	29.92596133	29,96710554	30.00143537	30.04276239	30.07255773	30.09566742	30.11260706	30.14986009	30.1759781	30.19774275	30.2338485							
cont		A	25402.0307	25395.12601	25388.21214	25386.90471	25381.79388	25388.92141	25390.83787	25390.98813	25387.78847	25388.22014	25368.91688	25355.68597	25338.81561	25332.20614	25325.62617	25311.40475	25300.54087	25292.75592	25282.25935							
Table 1/	Dodecane	P lab	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000	100000					and the state of t		

APPENDIX B STEP SWIRL COMBUSTOR (SSC) (SELECTED DATA SET)

Table 1 Swirler Vane Angles and Swirler Vane Lengths for the SSC

Inner swirler (6 vanes)

Vane angle (degrees)	Direction	Length (mm)
30	clockwise	25
30	counter-clockwise	25
45	clockwise	19
45	counter-clockwise	19
60	clockwise	19
60	counter-clockwise	19

Outer swirler (12 vanes)

Vane angle (degrees)	Direction	Length (mm)
30	clockwise	32
45	clockwise	25
60	clockwise	25

Table 2 Flame Length Measurements in the SSC (stoichiometric conditions using propane fuel)

Vane angle combination (θ/θ _o), degrees		Ai		combina	ation	
Co-swirl	16/8	32/8	48/8	16/16	32/16	48/16
30/30	150	127	162	66	86	122
45/30	56	81	111	71	76	117
60/30	66	86	127	71	91	152
30/60	51	127	193	41	56	76
45/60	35	56	71	41	46	51
60/60	25	71	132	46	51	61
Counter-swirl				'		<u> </u>
30/30	86	182	238	66	101	172
45/30	61	147	127	71	86	182
60/30	117	111	127	76	182	203
30/60	76	162	213	41	56	117
45/60	35	61	127	41	51	66
60/60	41	157	122	51	51	76

Table 3 Lean Blowouts (Equivalence Ratios) in the SSC (propane fuel)

Vane angle combination		Aiı	r velocity o	combinati	on	
(θ/θ _o), degrees	<u> </u>	···	(U/U ₀), m/s	_	
Co-swirl	16/8	32/8	48/8	16/16	32/16	48/16
30/30	0.38	0.42	0.45	0.43	0.44	0.45
45/30	0.41	0.42	0.43	0.44	0.45	0.46
60/30	0.42	0.43	0.46	0.44	0.45	0.49
30/45	0.10	0.41	0.44	0.43	0.44	0.47
45/45	0.34	0.39	0.41	0.41	0.41	0.45
60/45	0.36	0.42	0.44	0.41	0.43	0.44
30/60	0.37	0.37	0.39	0.41	0.41	0.43
45/60	0.36	0.36	0.38	0.39	0.38	0.40
60/60	0.35	0.39	0.41	0.38	0.40	0.41
Counter-swirl						
30/30	0.29	0.42	0.46	0.41	0.46	0.46
45/30	0.44	0.43	0.44	0.43	0.49	0.47
60/30	0.45	0.42	0.45	0.43	0.49	0.50
30/45	0.10	0.43	0.46	0.44	0.43	0.48
60/45	0.36	0.43	0.46	0.42	0.43	0.44
30/60	0.17	0.41	0.44	0.39	0.41	0.46
45/60	0.36	0.42	0.43	0.41	0.41	0.44
60/60	0.35	0.41	0.42	0.39	0.41	0.43

Table 4 Rich Blowouts (Equivalence Ratios) in the SSC (propane fuel)

Vane angle combination (θ _ε /θ _o), degrees		A	•	y combinat J _o), m/s	ion	
Co-swirl	16/8	32/8	48/8	16/16	32/16	48/16
30/45	2.07	1.86	2.02	2.13	2.16	
45/45	1.98	1.91	1.79	2.07	2.07	1.97
60/45			1.70		2.02	
45/60	2.04	1.97		2.02	2.07	
Counter-swirl						
30/45	2.08	1.90	2.05			

Table 5 Test Conditions for the Swirl Combustor for PDF Model Validation

	LDA	
Annulus	Swirl Angle	U,
Air jet	45° swirl	100 m/s
Air jet	45° swirl	25 m/s
Air jet	60° swirl	25 m/s
Hydrogen jet	No swirl	25 m/s
Hydrogen jet	No swirl	100 m/s
Hydrogen jet	30° swirl	100 m/s
Hydrogen jet	45° swirl	100 m/s
	CARS	100 120
Annulus	Swirl Angle	U _i
Hydrogen jet	No swirl	25 m/s
Hydrogen jet	No swirl	100 m/s
Hydrogen jet	30° swirl	100 m/s
Hydrogen jet	45° swirl	100 m/s

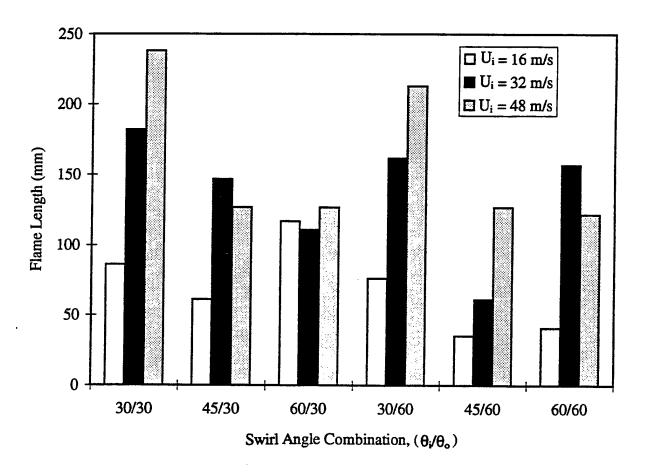


Figure 1 Variation of flame length with swirl angle combinations at three different values of inner air velocity ($U_0 = 8$ m/s, counter-swirl, propane, stoichiometric conditions).

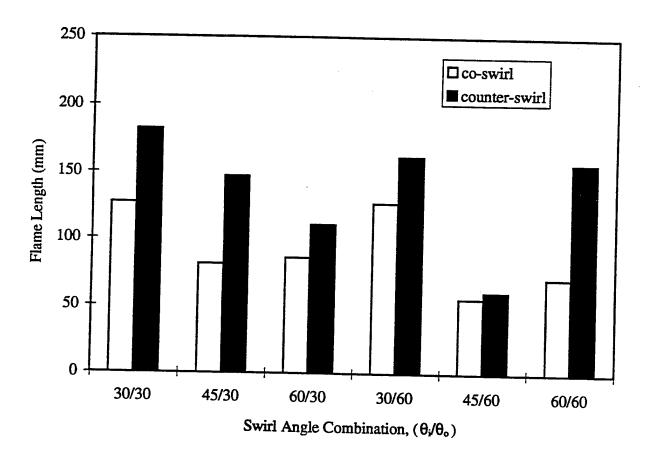


Figure 2 A comparison of flame lengths with co- and counter-swirl arrangements for a variety of swirl angle combinations ($U_i = 32 \text{ m/s}$, $U_o = 8 \text{ m/s}$, propane, stoichiometric conditions).

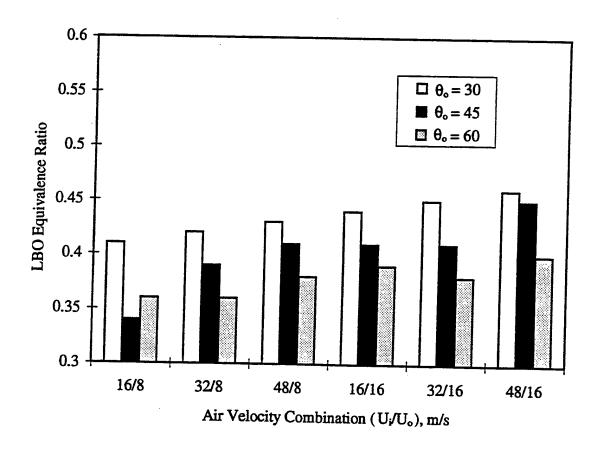


Figure 3 Effect of outer swirl angle on LBO for a variety of air velocity combinations $(\theta_i = 45^\circ$, co-swirl, propane).

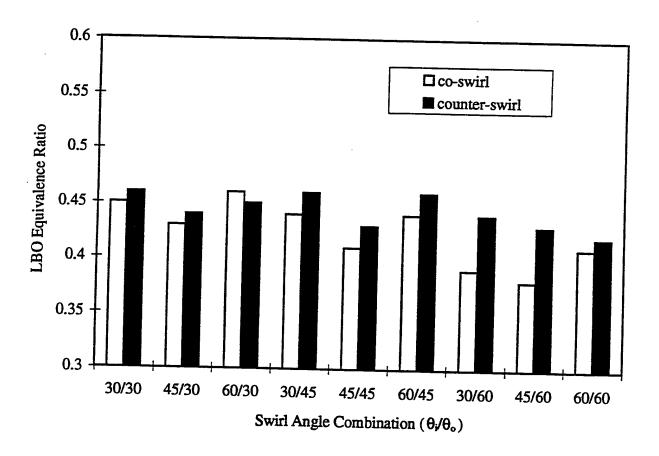


Figure 4 A comparison of LBO data for co- and counter-swirl arrangements for a variety of swirl angle combinations ($U_i = 48 \text{ m/s}$, $U_o = 8 \text{ m/s}$, propane).

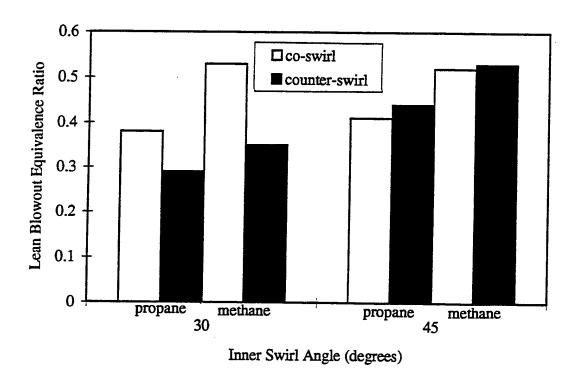


Figure 5 LBO data comparing inner swirl angle (θ_i), co-swirl and counter-swirl, and methane with propane ($\theta_o = 30^\circ$, $U_i = 14.4$ m/s, $U_o = 8.6$ m/s).

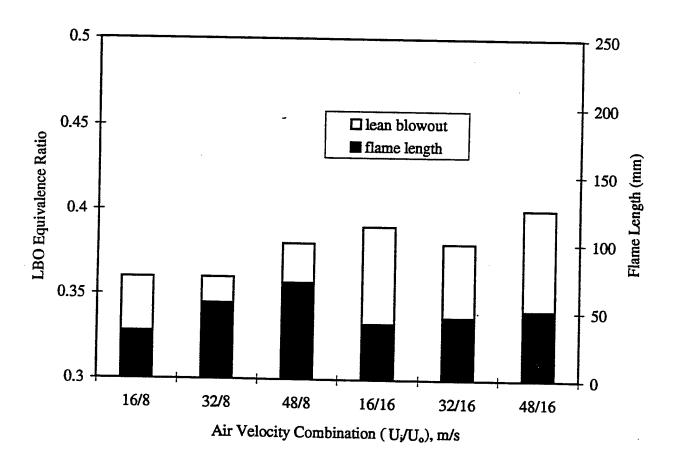


Figure 6 Variation of LBO and flame length with air velocity combinations for an optimum swirl angle configuration, $\theta_i = 45^{\circ}$, $\theta_o = 60^{\circ}$, co-swirl (propane, flame length at stoichiometric conditions).

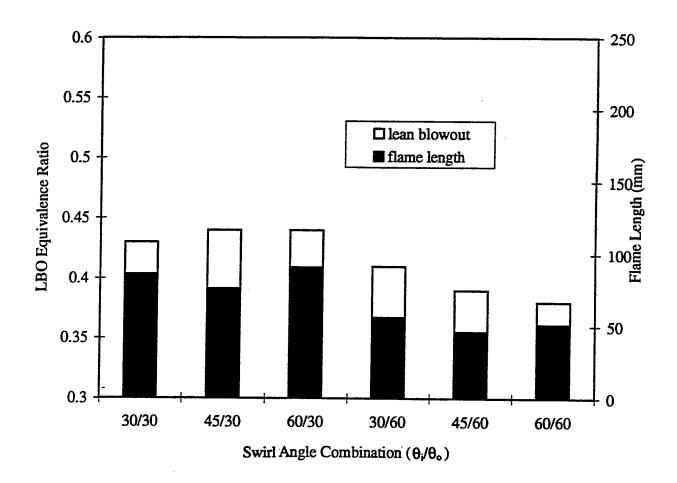


Figure 7 Variation of LBO and flame length with swirl angle combinations for an optimum air velocity split, $U_i = U_o = 16$ m/s (co-swirl, propane, flame length at stoichiometric conditions).

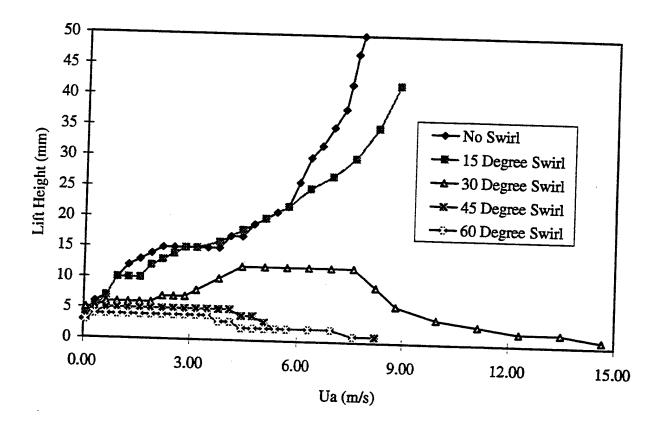


Figure 8 Lift heights at critical points in a double-concentric hydrogen-air jet diffusion flame for jet tube diameter of 2.39 mm for no swirl, 15°, 30°, 45°, and 60° swirl.

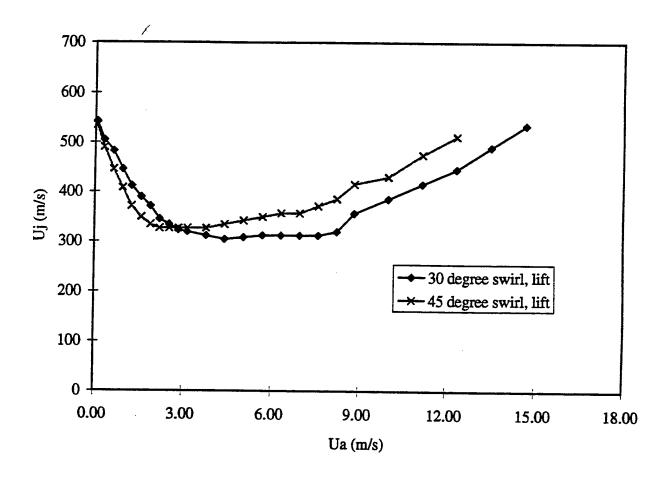


Figure 9 Stabilization effects of swirl in a double-concentric hydrogen-air jet diffusion flame for jet tube diameter of 2.39 mm.

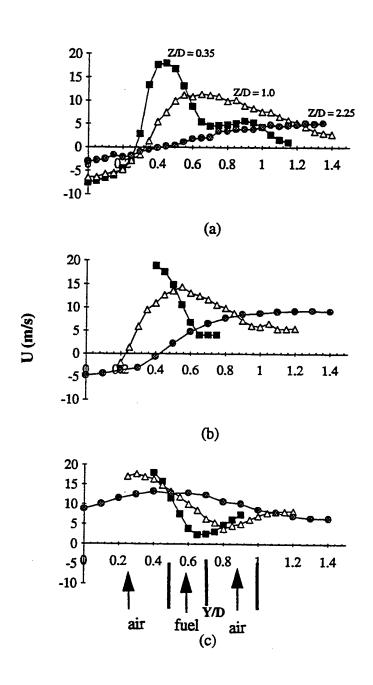


Figure 10a-c Radial variation of mean axial velocity at three different locations downstream of the fuel nozzle: (a) cold flow co-swirl, (b) hot flow co-swirl, (c) hot flow counter-swirl.

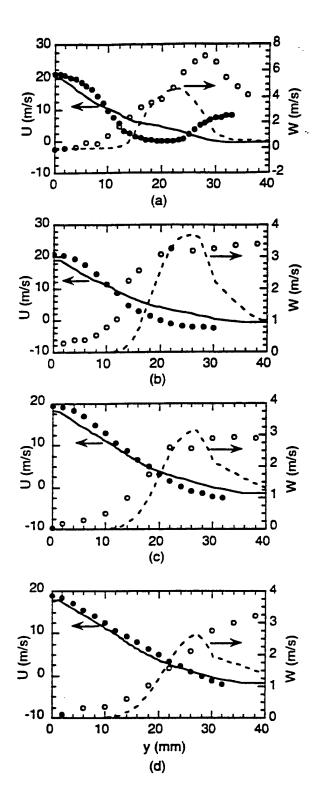


Figure 11 Calculated (lines) and measured (symbols) axial and swirl velocities for $\theta_i = 0^\circ$ case at axial locations (a) 20 mm, (b) 40 mm, (c) 60 mm, and (d) 80 mm.

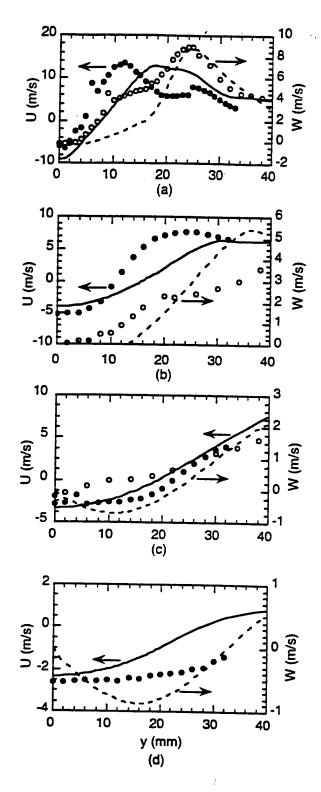


Figure 12: Calculated (lines) and measured (symbols) axial and swirl velocities for $\theta_i = 30^\circ$ case at axial locations (a) 20 mm, (b) 40 mm, (c) 60 mm, and (d) 80 mm.

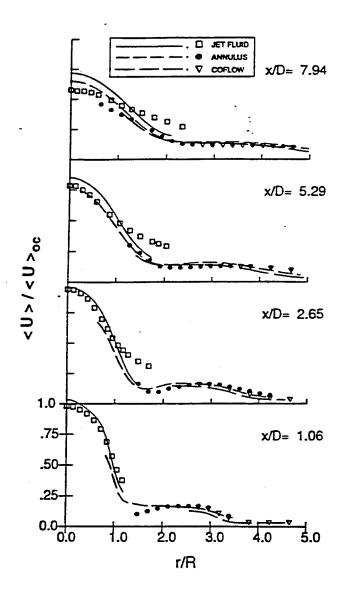


Figure 13 Radial profiles of computed conditional mean axial velocity (lines) compared against data (symbols) for the 30° swirl case.

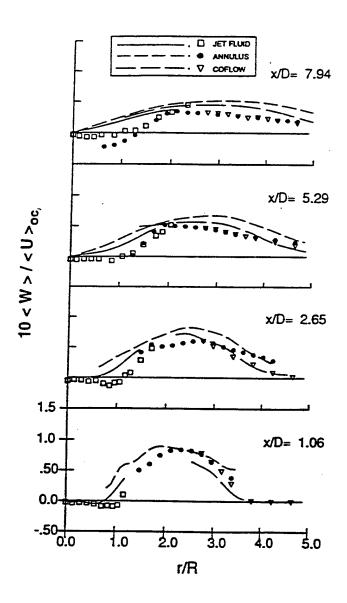


Figure 14 Radial profiles of computed conditional mean tangential velocity (lines) compared against data (symbols) for the 30° swirl case.

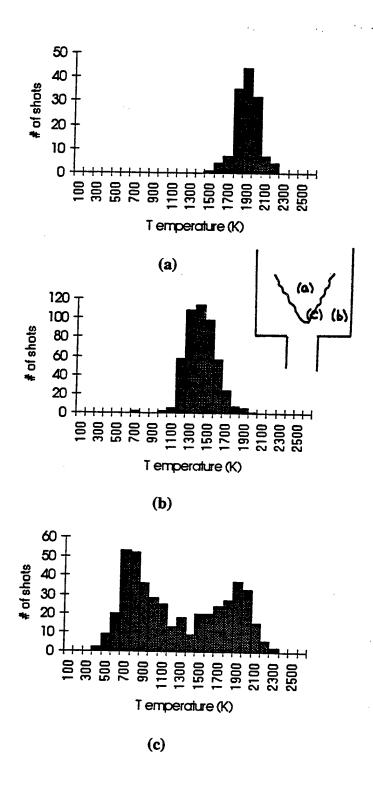


Figure 15a-c: PDF of CARS temperatures for (a) hot gas state, (b) intermediate gas state, and (c) bimodal gas state.

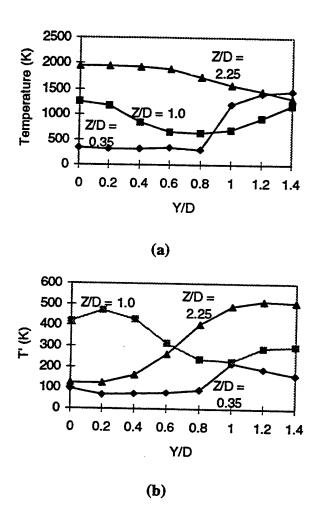
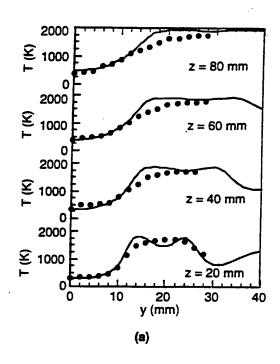


Figure 16a-b Radial variation of CARS (a) mean temperature and (b) rms temperature at three different downstream locations in the SSC.



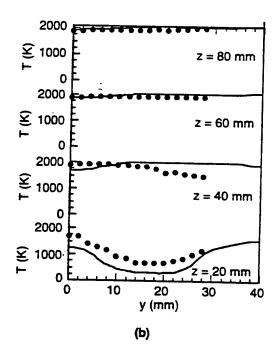


Figure 17a-b Radial temperature profiles at different axial locations for (a) $\theta_i = 0^\circ$, and (b) $\theta_i = 30^\circ$ co-swirl [calculated (lines), data (symbols)].

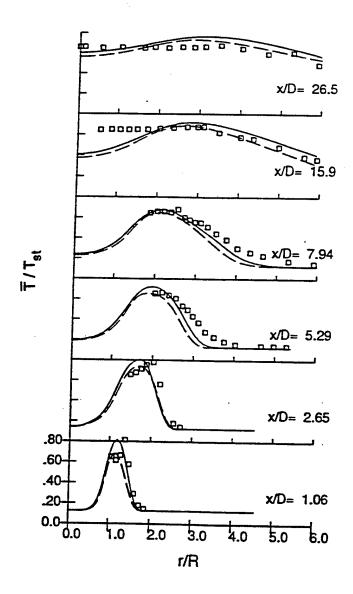


Figure 18 Computed radial profiles of Reynolds-averaged mean temperature with (solid lines) and without (dotted lines) the inclusion of molecular diffusion compared against CARS data (symbols) for the 30° swirl case.

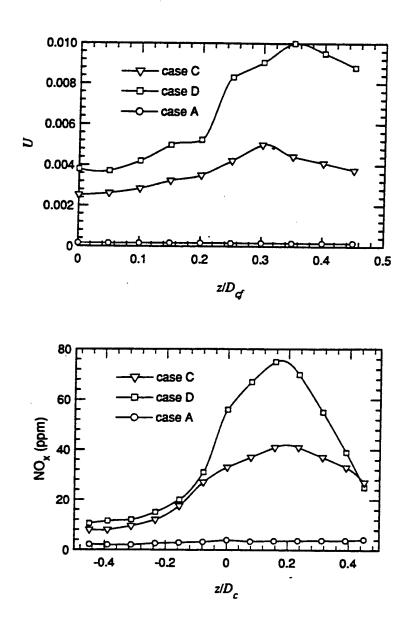


Figure 19 Profiles of unmixedness parameter U and corresponding profiles of NO_x emissions.

APPENDIX C SWIRLING JET DIFFUSION FLAME (SELECTED DATA SET)

Filename Format

The data set for the measurements of swirling and nonswirling turbulent hydrogen jet diffusion flames is stored in an electronic form (ASCII format) and available on request from Dr. F. Takahashi (e-mail: ftakahas@engr.udayton.edu). A brief description of the measurements is also available on the World Wide Web page (http://www.ca.sandia.gov/tdf/DataSums/TakahashH2.html). Each data file is headed with a FILENAME. The FILENAMEs have the following format for the velocity and temperature data: *JdtsVzzz.PPn* (upper case: letter, lower case: number). The definitions of these characters are listed below.

```
J: type of jet fluid
```

$$If J = A, \quad air \\ = H, \quad hydrogen$$

d: fuel tube diameter (d)

If
$$d = 9$$
, $d = 9.45 \text{ mm}$

t: fuel tube lip thickness (δ)

If
$$t = 0$$
, $\delta = 0.2 \text{ mm}$
= 1, $\delta = 1.2 \text{ mm}$

s: swirler helix angle (θ)

If
$$s = 0$$
, $\theta = 0$
= 1, $\theta = 15$
= 3, $\theta = 30$
= 4, $\theta = 45$
= 6, $\theta = 60$

V: average velocities at the jet exit plane

If
$$V = A$$
, $U_j = 100$, $U_a = 20$, $U_e = 4 \text{ m/s}$
= B, $U_i = 25$, $U_a = 4$, $U_e = 1 \text{ m/s}$

zzz: radial profile's axial position (x) or axial profile

If zzz = a number, the file is a radial profile at axial position zzz e.g., 001, x = 1.5 mm

010, x = 10 mm

025, x = 25 mm

050, x = 50 mm

075, x = 75 mm150, x = 150 mm

x = 130 mm225, x = 225 mm

= AX, the file is an axial profile along the jet centerline (y = 0).

PP: LDV particle seeding method.

If $PP = J_$, the velocity data with particles added to jet fluid only

= A_, the velocity data with particles added to annulus fluid only

= E_, the velocity data with particles added to external fluid only

= T, the temperature data

n: file ID number, 1 or 2.

If
$$n = 1$$
, the file includes $r, z, U, V, W, (u'), (v'), (w'), u'v', v'w', w'u'$
= 2, the file includes $r, z, u'^3, v'^3, w'^3, u'^2v', v'^2u', v'^2w', w'^2v', w'^2u', u'^2w', u'^4, v'^4, w'^4$

Table C1 Data Filenames and Test Conditions

Filename	Extension		θ	<i>U</i> j (m/s)	<i>U</i> _a (m/s)	U _e (m/s)	x (mm)	Seed	
H900B001	.J_1	.j_2	0°	25	4	1	1.5	Jet	
H900B001	.A_1	.A_2	0°	25	4	1	1.5	Annulus	
H900B001	.E_1	.E_2	0°	25	4	1	1.5	External	
H900B010	.J_1	.j_2	0°	25	4	1	10	Jet	
H900B010	.A_1	.A_2	0°	25	4	1	10	Annulus	
H900B010	.E_1	.E_2	0°	25	4	1	10	External	
H900B025	.J_1	.j_2	0°	25	4	1	25	Jet	
H900B025	.A_1	.A_2	0°	25	4	1	25	Annulus	
H900B025	.E_1	.E_2	0°	25	. 4	1	25	External	
H900B050	.J_1	.j_2	0°	25	4	1	50	Jet	
H900B050	.A_1	.A_2	0°	25	4	1	50	Annulus	
H900B050	.E_1	.E_2	0°	25	4	1	50	External	
H900B075	.J_1	.j_2	0°	25	4	1	75	Jet	
H900B075	.A_1	.A_2	0°	25	4	1	75	Annulus	
H900B075	.E_1	.E_2	0°	25	4	1	75	External	
H900B150	.J_1	.j_2	0°	25	4	1	150	Jet	
H900B150	.A_1	.A_2	0°	25	4	1	150	Annulus	
H900B150	.E_1	.E_2	0°	25	4	1	150	External	
H900B225	.J_1	.j_2	0°	25	4	1	225	Jet	
H900B225	.A_1	.A_2	0°	25	4	1	225	Annulus	
H900B225	.E_1	.E_2	0°	25	4	1	225	External	
H900BAX	. . J_1	.j_2	0°	25	4	1	1.5-225	Jet	
H910A001 H910A001 H910A001	.J_1 .A_1 .E_1	.j_2 .A_2 .E_2	0° 0° .0°	100 100 100	20 20 20	4 4 4	1.5 1.5 1.5	Jet Annulus External	

H910A010	.J_1	.j_2	0°	100	20	4	10	Jet
H910A010	.A_1	.A_2	0°	100	20	4	10	Annulus
H910A010	.E_1	.E 2	0°	100	20	4	10	External
H910A025	.J_1	.j_2	0°	100	20	4	25	Jet
H910A025	.A_1	.A_2	0°	100	20	4	25	Annulus
H910A025	.E_1	.E_2	0°	100	20	4	25	External
H910A050	. <u>. </u>	.j_2	0°	100	20	4	50	Jet
H910A050	.5_1 .A_1	.A_2	0°	100	20	4	50	Annulus
H910A050	.E_1	.E_2	0°	100	20	4	50	External
			0°	100	20	4	75	Jet
H910A075	.J_1	.j_2		100	20	4	75 75	Annulus
H910A075	.A_1	.A_2	0°				75 75	External
H910A075	.E_1	.E_2	0°	100	20	4		
H910A150	.J_1	.j_2	0°	100	20	4	150	Jet
H910A150	.A_1	.A_2	0°	100	20	4	150	Annulus
H910A150	.E_1	.E_2	0°	100	20	4	150	External
H910A225	.J_1	.j_2	0°	100	20	4	225	Jet
H910A225	.A_1	.A_2	0°	100	20	4	225	Annulus
H910A225	.E_1	.E_2	0°	100	20	4	225	External
H910AAX	.J <u>_</u> 1	.j_2	0°	100	20	4	1.5-225	Jet
******	T 1		200	100	20	4	1.5	Jet
H903A001	.J_1	.j_2	30°	100				
H903A001	.A_1	.A_2	30°	100	20	4	1.5	Annulus
H903A001	.E_1	.E_2	30°	100	20	4	1.5	External
H903A010	.J_1	.j_2	30°	100	20	4	10	Jet
H903A010	.A_1	.A_2	30°	100	20	4	10	Annulus
H903A010	.E_1	.E_2	30°	100	20	4	10	External
H903A025	.J_1	.j_2	30°	100	20	4	25	Jet
H903A025	.A_1	.A_2	30°	100	20	4	25	Annulus
H903A025	.E_1	.E_2	30°	100	20	4	25	External
H903A050	.J_1	.j_2	30°	100	20	4	50	Jet
H903A050	.A_1	.A_2	30°	100	20	4	50	Annulus
H903A050	.E_1	.E_2	30°	100	20	4	50	External
H903A075	.J_1	.j_2	30°	100	20	4	75	Jet
H903A075	.A_1	.A_2	30°	100	20	4	75	Annulus
H903A075	.E_1	.E_2	30°	100	20	4	75	External
H903A150	.J_1	. <u>j_</u> 2	30°	100	20	4	150	Jet
H903A150	.A_1	.A_2	30°	100	20	4	150	Annulus
H903A150	.E_1	.E_2	30°	100	20	4	150	External
H903A130	.b_1 .J_1	.b_2 .j_2	30°	100	20	4	225	Jet
H903A225	.3_1 .A_1	.J_2 .A_2	30°	100	20	4	225	Annulus
		.A_2 .E_2	30°	100	20	4	225	External
H903A225	.E_1			100	20	4	1.5-225	Jet
H903AAX	.J_1	.j_2	30°	100	20	4	1.3-223	Jei
H904A001	. J _1	.j_2	45°	100	20	4	1.5	Jet
H904A001	.A_1	.A_2	45°	100	20	4	1.5	Annulus
H904A001	.E_1	.E_2	45°	100	20	4	1.5	External
H904A010	.J_1	.j_2	45°	100	20	4	10	Jet
H904A010	.A_1	.A_2	45°	100	20	4	10	Annulus
H904A010	.E_1	.E_2	45°	100	20	4	10	External
H904A025	. <u>L_1</u> .J_1	. <u>b_2</u> .j_2	45°	100	20	4	25	Jet
H904A025	.3_1 .A_1	.J_2 .A_2	45°	100	20	4	25	Annulus
		.A_2 .E_2	45°	100	20	4	25	External
H904A025	.E_1			100	20	4	50	Jet
H904A050	.J_1	.j_2	45°	100	20	4	30	JEL

H904A050 H904A050 H904A075 H904A075 H904A150 H904A150 H904A225 H904A225 H904A225 H904AAX	.A_1 .E_1 .J_1 .A_1 .E_1 .J_1 .A_1 .E_1 .J_1 .A_1 .E_1 .J_1 .J_1 .A_1 .J_1 .A_1 .E_1	.A_2 .E_2 .j_2 .A_2 .E_2 .j_2 .A_2 .E_2 .j_2 .A_2 .E_2 .j_2	45° 45° 45° 45° 45° 45° 45° 45° 45° 45°	100 100 100 100 100 100 100 100 100 100	20 20 20 20 20 20 20 20 20 20 20 20	4 4 4 4 4 4 4 4	50 50 75 75 75 150 150 225 225 225 1.5-225	Annulus External Jet Annulus External Jet Annulus External Jet Annulus External Jet Annulus
H900B001	Γ.		0°	25	4	1	1.5	
H900B010	Γ.		0°	25	4	1	10	
H900B025	.T		0°	25	4	1	25	
H900B050	Τ.	•	0°	25	4	1	50	
H900B075	T.	•	0°	25	4	1	75	
H900B150	Γ.	•	0°	25	4	1	150	
H900B225	T.	•	0°	25	4	1	225	
H910A001	T.		0°	100	20	4	1.5	
H910A010	Τ.		0°	100	20	4	10	
H910A025	.T		0°	100	20	4	25	
H910A050	T.		0°	100	20	4	50	
H910A075	T.		0°	100	20	4	75	
H910A150	T.		0°	100	20	4	150	
H910A225	T.	•	0°	100	20	4	225	
H903A001	Т.	•	30°	100	20	4	1 7	
H903A010	 T.		30°	100	20	4	1.5	
H903A025	.T			100		4	10	
H903A050			30°	100	20	4	25 50	
H903A075	.T .T		30°		20	4	50	
H903A150			30°	100	20	4	75 150	
H903A225	.T .T		30°	100 100	20	4	150	
11903A223	.1		30°	100	20	4	225	
H904A001	Т.		45°	100	20	4	1.5	
H904A010	.T		45°	100	20	4	10	
H904A025	.T		45°	100	20	4	25	
H904A050	.T		45°	100	20	4	50	
H904A075	T.		45°	100	20	4	75	
H904A150	.T		45°	100	20	4	150	
H904A225	.T		45°	100	20	4	225	

Listings of Selected Data Files

```
C FILENAME= H910A001.J 1
C H2 FLAME; d=9.45, d=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=1.5 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
 12 : No. of data points
                                                               u'v'
                                                                       v'w'
                                                                              w'u'
                                W
                                      SIG(u') SIG(v') SIG(w')
        x
                Ü
                                                     7.087
                                                             10.490
                                                                      .153
                                                                            -2.223
                       2.211
                              1.354 13.526 10.069
  4.70
        1.50 45.245
        1.50 63.038
                      2.455
                              .395
                                    17.458 11.805
                                                      6.816
                                                             47.540 -1.563 -7.021
 4.49
                              -.096 17.541 12.350
                                                      6.816
                                                             47.120 -1.605 -9.640
 4.30
        1.50 80.244
                       2.179
                              .176 13.925 9.812
                                                            51.473 -1.320 -2.454
                       .840
                                                     7.254
 4.00
        1.50 96.715
                       .814
                               .197 11.118
        1.50 106.534
                                             8.132
                                                     7.339
                                                             38.856
                                                                      .604 -2.605
 3.51
                                             7.320
                                                             30.055
                                                     7.056
                                                                      1.084
                                                                              . 930
        1.50 113.880
                       .744
                               .203
                                     9.677
 3.01
                                                            25.411 -1.126 -1.752
                               .195
                                     8.805 6.710
                       .475
                                                     6.718
 2.51
        1.50 119.246
                                                     6.102
                                                            21.539
                                                                     -.772 -3.260
       1.50 123.636
                       .288
                               .172
                                     8.134
                                             6.318
 2.00
                                                             13.717
                                                                      .366
                        .379
                               .039
                                      7.359
                                             5.757
                                                     5.532
                                                                             -.917
        1.50 127.633
 1.51
                                                                            -1.974
                                             5.313
                                                     5.073
                                                             11.360
                                                                      -.199
        1.50 130.283
                        .008
                               .051
                                      6.719
 1.01
                                                     4.742
                                                              4.832
                                                                      .979
                                                                             -.639
        1.50 132.161
                        .143
                               .020
                                      6.045
                                              4.968
  .51
                                                               .599
                                                                       .092
                                                                             -.288
                        .003
                                      5.843
                                             4.906
                                                    4.395
       1.50 132.947
                                .004
C FILENAME= H910A010.J 1
С
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=10 mm
  LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
 D090894
C 10 : No. of data points
                                                              u'v'
                                                                       v'w'
Су
                               W
                                      SIG(u') SIG(v') SIG(w')
               U
        х
                              1.981 13.384 10.200 11.936 89.749 -2.888 -2.301
 5.50 10.00 47.798
                       7.061
 5.00 10.00 60.681 6.716 1.777 15.929 11.585 13.037 110.695
                                                                     -.502
                                                                              .647
 4.51 10.00 75.968 5.069
4.01 10.00 92.260 1.501
                              2.037 17.337 12.785 12.997
1.403 16.730 12.002 12.086
                                                            114.151 -4.634 -11.047
                              2.037
                                                            93.429 -2.484 -4.355
                                             9.703
                                                    9.706
                                                            57.647 -1.097 -1.549
 3.41 10.00 106.451
                      -.638 1.210 13.453
                      -.472
                             .488 10.257
                                             7.556
                                                     7.464
                                                            28.801
                                                                     -.119 -3.538
 2.70
       9.99 116.605
                      -.297
                               .452
                                      8.545
                                              6.103
                                                      6.080
                                                             18.917
                                                                      .311 -2.087
 2.01
       10.00 123.160
                                                             12.029
                               .185
                      -.322
                                     7.181
                                              5.350
                                                     5.233
                                                                      -.885 -1.406
       10.00 128.239
 1.30
                                                                      .235
                                                     4.765
                                                              5.680
                                                                             -.158
  .62 10.00 130.866
                      -.201
                               .058
                                     6.537
                                             5.090
                      -.302
                               .101
                                      6.306
                                             5.018
                                                     4.615
                                                              -.323
                                                                       .353
                                                                            -.729
   .01 10.00 131.208
C FILENAME= H910A025.J 1
 H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=25 mm
 LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
C 12 : No. of data points
                                W
                                      SIG(u') SIG(v') SIG(w')
                                                              u'v'
                                                                       v'w'
                                                                              w'u'
                U
        x
                                                            43.624
                                                                       .584
                                                                             2.826
                                                    8.780
 7.00 25.00 40.000
                      4.442
                               .548 10.343
                                             7.167
                      4.184
                              1.351
                                     12.630
                                              9.113 11.048
                                                             67.799
                                                                       .045
                                                                              3.467
 6.01
       25.00 51.245
                              1.655 14.016 10.557 12.120
                     4.699
       25.00 59.076
                                                            87.083 -3.623 -1.355
 5.51
                              2.069 15.379 11.444 12.835 101.362
2.178 17.038 12.361 13.440 111.294
1.641 17.457 12.691 13.049 111.088
 5.01 25.00 66.806
                      4.388
                                                                      .984
                                                                             -.644
              76.153
                      4.399
                                                            111.294 -5.517
                                                                            -7.605
 4.50 25.00
                      3.276
                                                                     1.904 -3.777
 4.01
       25.00
             86.412
                     1.749
                              1.300 16.298 11.842 11.973
                                                            92.842
                                                                     -.232 -6.712
 3.41
       25.00
             98.616
                                     14.283 10.365 10.106
                      1.002
                              1.176
                                                             70.032
                                                                      1.265
                                                                            -4.581
 2.70 25.00 111.837
                                                                      .419 -3.889
                                                             34.493
       25.00 121.454
                      -.143
                               .403 10.964
                                             8.316
                                                    8.146
 2.01
                               .268
                                     8.669
                                              6.679
                                                     6.466
                                                             16.780
                                                                       .420
                                                                             -.481
 1.29 25.00 127.682
                      -.291
                               .376
                                      7.772
                                                     5.487
                                             5.805
                                                              7.021
                                                                       .140 -1.086
                      -.157
  .62 25.00 130.651
                                                                      1.606 -1.668
                              -.049
                                      7.129
                                              5.582
                                                     5.218
                                                              -.233
   .01 25.00 131.472
                      -.229
C FILENAME= H910A050.J 1
C H2 FLAME; d=9.45, d=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=50 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
 11 : No. of data points
С
                                      SIG(u') SIG(v') SIG(w')
                                                               u'v'
                                                                               w'u'
                                W
        x
                U
                        V
                                                                       .917 -1.676
                                                     7.484 27.519
                               .642
 8.80 49.99 35.764
                       3.672
                                      8.774 5.877
                      3.675
                               .644
                                      9.489
                                              6.538
                                                     8.318
                                                             32.578
                                                                       .866
                                                                             1.620
 8.22 49.99 40.069
                     3.0
3.749
                               .759 11.372 8.137 10.209
                                                            50.565 -1.965
                                                                            -1.294
  7.01 49.99 49.646
```

```
6.00 49.99 57.945 3.504
                                   1.738 13.140 9.482 11.903
1.531 15.356 11.025 12.605
                                                                       67.875 -2.190
                                                                                          - 967
   5.01 49.99 67.518
                          3.189
                                                                       90.926 -1.579 -7.205
                          2.831
                                   1.696 16.747 11.750 12.902
1.235 16.185 11.578 11.828
.935 15.758 11.535 11.014
   4.00 49.99 79.731
                                                                        99.144 1.587 -5.555
   2.72 49.99 97.285
                           1.985
                                                                        84.821
                                                                                 2.192 -7.972
                           .929
   2.00 49.99 106.157
                                                                        79.219
                                                                                 -.367 -9.674
   1.30 49.99 113.972
                           .405
                                                                       46.716 1.479 -8.504
                                    .589 14.018 10.367 9.708
                                     .331 11.742
.511 11.439
    .60 49.99 119.552
                            .511
                                                    9.734 8.746
9.462 8.816
                                                                       17.026
                                                                                 1.492 -6.419
    .00 49.99 120.325
                          -.367
                                                             8.816
                                                                       -4.297
                                                                                 .136 -4.541
C FILENAME= H910A075.J 1
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=75 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
   D090894
C 12 : No. of data points
          х
                   U
                                     W
                                             SIG(u') SIG(v') SIG(w')
                                                                        u'v'
                                                                                  v'w'
                                                                                           w'u'
  11.00 75.00 33.019 3.721
9.49 75.00 40.316 3.475
8.23 75.00 47.728 3.742
 11.00 75.00 33.019
9.49 75.00 40.316
                                   .110 8.148 4.949 7.151 21.340 1.071 .546 8.839 6.065 8.634 25.152 .569
                                                                                          -.669
                                    .546
                                                    6.065 8.634
7.447 9.660
                                                                                .569
                                                                                           .101
                                     .499 10.271
                                                                       37.627
                                                                                  .411
                                                                                          -.873
  7.01 75.00 54.961 3.849 1.207 11.694 8.535 10.839
                                                                       49.695 1.922
                                                                                           .478

    5.99
    75.00
    60.155
    3.343
    1.202
    12.798
    9.693
    11.411

    5.00
    75.00
    68.076
    3.083
    1.223
    13.815
    10.532
    11.809

    3.99
    75.00
    75.808
    2.899
    1.430
    14.925
    11.181
    12.060

    2.72
    75.00
    87.425
    1.793
    1.160
    15.575
    11.293
    11.613

                                                                       63.522 -1.228 -6.162
                                                                       68.806 -2.526 -8.012
                                                                       74.422 2.027 -5.927
                                                                       66.776
                                                                                 -.755 -7.665
  2.00
         75.00 93.184
                          1.393 1.240 14.995 11.540 10.996
                                                                       55.989
                                                                               5.786 -8.213
                                   .970 14.566 11.448 10.493 33.976 .838 -3.772
.991 13.889 11.213 10.119 13.381 1.639 -8.131
.784 13.714 11.004 10.073 -4.609 3.454 -9.884
  1.30 75.00 97.597
                           1.059
   .61 75.00 100.550
                           .399
    .00 75.00 100.847
                           .110
C FILENAME= H910A150.J_1
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=150 mm
  LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C 15 : No. of data points
          x
                  Ū
                                     W
                                             SIG(u') SIG(v') SIG(w') u'v'
                                                                                 v'w'
                                                                                           w'u'
 16.00 150.00 32.543
                                    .375
                                            7.119 4.563 6.875 14.028
7.889 5.235 7.556 17.348
                          3.628
                                                                                -.479
                                                                                           .519
 13.99 150.00 36.672
                         4.016
                                    .237
                         3.640
                                            7.889
                                                                                 .395
                                                                                          1.720
 11.99 150.00 40.661
                                    .259
                                            8.526 5.836 7.958 23.405
                                                                               1.151 1.320
 10.00 150.00 45.669
                                    .876
                                                    6.268 8.111 23.247
6.676 8.427 27.511
                                             8.844
                                                                                 .715 -2.045
  9.00 150.00 47.279
                         3.080
                                    .192
                                            9.249
                                                                                 -.012 -1.994
  8.01 150.00 50.193
                                                    6.724 8.501 27.153
7.003 8.523 29.648
7.178 8.550 25.921
                          3.072
                                  .416 9.224
                                                                                  .933
                                                                                          .124
  7.01 150.00 52.207
                          2.705
                                    .302
                                            9.856
                                                                       29.648 1.327
                                                                                         -.744
                         2.273
  5.99 150.00 54.615
                                           9.749
                                    .132
                                                                                 3.413 -2.951
  5.00 150.00 56.927
3.99 150.00 59.859
                          1.819
                                  .503 10.216
                                                            8.210
                                                                                3.495 -1.077
                                                    7.325
                                                                       26.735
                          1.612
                                    .490
                                           9.411
                                                            8.227
8.020
                                                     7.212
                                                                                -.953 -3.899
-.170 -6.716
                                                                       19.625
                                           9.457
  3.00 150.00 61.912
                          1.469
                                    .411
                                                     7.223
                                                                       18.576
  2.01 150.00 63.611
                           .966
                                  .234
                                          9.647
                                                     7.415
                                                             7.639 10.186
                                                                                1.037 -4.116
  1.01 150.00 64.592
                                    .660
                           .435
                                            9.573
                                                     7.286
                                                              7.784
                                                                      5.116
                                                                                2.119 -5.857
   .51 150.00 65.262
                                                                                -.190 -3.387
                            .157
                                    .301
                                            9.209
                                                     7.265
                                                              7.597
                                                                        2.818
   .00 150.00 64.906
                                                            7.717
                          -.029
                                                    7.443
                                    .311 9.579
                                                                         .603
                                                                                 .391 -5.104
C FILENAME= H910A225.J 1
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=225 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
C 13 : No. of data points
         x
                  Ū
                                     W
                            V
                                            SIG(u') SIG(v') SIG(w') u'v'
                                                            5.630
5.630
                                                                                 v'w'
 24.00 225.00 26.731
                          3.348
                                    .200
                                            5.428
                                                                                .275
                                                     3.576
                                                                       8.537
                                                                                           .671
 21.99 224.99 28.699
                                  .252
                                                                     10.124
                          3.500
                                            5.915
                                                     3.896
                                                              5.915
                                                                                 .400
                                                                                           .630
                                  .060
 20.00 224.99 30.875
                          3.500
                                           6.131 4.274
                                                              6.285
                                                                      10.947
                                                                                 .225 -1.317
 18.00 224.99 32.601
                          3.266
                                   .198
                                            6.734
                                                            6.123 12.208
6.325 12.465
                                                    4.421
                                                                                  .169
 15.99 224.99 35.026
                                  -.034
                          3.167
                                            6.877
                                                    4.606
                                                                      12.465
                                                                                1.387
                                                                                          .480
 13.99 224.99 37.397
                          2.925
                                  -.250
                                                            6.372
                                                                     11.581
                                           6.950
                                                    4.645
                                                                                 .926
                                                                                         -.615
11.99 224.99 40.639
10.00 224.99 43.182
                          2.459
                                  -.054
                                           7.570
                                                    5.470
                                                             7.293
                                                                     15.476
                                                                                 -.862
                                                                                        -.386
                          2.619
                                  -.035
                                           6.908
                                                     4.983
                                                             6.149
                                                                     11.437
11.443
                                                                                 .231 -1.101
  8.00 224.99 45.480 2.312
                                  -.037
                                           6.865
                                                     5.184
                                                             6.277
                                                                                 .578 -1.480
 5.99 224.99 46.637
3.98 224.99 48.849
                          1.601
                                  -.228 7.002
                                                     5.207
                                                             6.178
                                                                      9.452
                                                                               1.569 -1.753
                          1.329
                                   -.153
                                          6.813
6.725
                                                     5.150
                                                              6.019
                                                                      6.286
                                                                               -.072 -1.666
  2.00 224.99 49.905
                          .623
                                   .090
                                                     5.239
                                                             5.827
                                                                        3.885
                                                                                .115 -2.420
```

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.01 224.99 50.004 -.084 -.153 6.906 5.086 5.658
                                                              .566
                                                                     .129 -1.440
C FILENAME= H910A001.A 1
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=1.5 mm
 LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C 11 : No. of data points
                                     SIG(u') SIG(v') SIG(w') u'v'
                                                                     v'w'
               U
                       V
                               W
                              .659
                                                            4.899
                                                                           -.187
                                   3.432 2.886 2.678
                                                                     .161
 13.50
       1.50 13.952
                      1.614
                     .577
                              .520
                                    2.961
2.427
                                                                     .182
                                             2.109
                                                    2.268
                                                             2.660
                                                                           -.148
       1.50 17.695
 13.00
                       .193
                                                                           -.125
 12.49
        1.50 19.672
                              .528
                                             1.631
                                                    1.879
                                                             1.406
                                                                     .143
                                                                            -.275
        1.50 21.022
                       .127
                              .577
                                    2.146
                                             1.372
                                                    1.639
                                                            1.048
                                                                     .071
 12.00
                                             1.194
                                                    1.432
                                                            .660
                                                                     .038
                                                                           -.107
                                    1.766
       1.50 22.600
                       .149
                              .664
 11.19
                                                    1.255
                                                             .304
                                                                    -.034
                                                                           -.181
 10.40
        1.50 23.346
                       .088
                              .589
                                     1.474
                                            1.059
                                             .997
                                                             -.084
                                                                    -.056
                                                                           -.137
                                     1.326
                                                    1.186
  9.60
        1.50
             23.493
                       .071
                              .478
                                     1.586
                                             1.097
                                                    1.319
                                                            -.587
                                                                    -.057
                                                                           -.135
        1.50
             22.706
                     -.058
                              .295
 8.20
                                            1.338
1.375
                              .099
                      -.265
                                     2.184
                                                    1.663
                                                            -1.358
                                                                    -.025
                                                                            -.168
  6.99
        1.49
             20.177
                     -.697
                              -.037
                                     3.190
                                                    1.742
                                                            -1.934
                                                                     .000
                                                                            -.178
  6.01
        1.50
             15.249
              7.597 -2.581 -.082
                                    2.005 1.066 1.417
                                                             -.617
                                                                    -.004
 5.51
        1.50
C FILENAME= H910A010.A_1
C H2 FLAME; d=9.45, d=1.2 mm; theta=0 deq.; Uj=100, Ua=20, Ue=4 m/s; x=10 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
  9 : No. of data points
Су
                                     SIG(u') SIG(v') SIG(w') u'v'
                                                                     v'w'
                                                                            w'u'
               U
                       7.7
                               W
        x
                                    3.344
                              .496
                                             2.974
                                                    3.017
                                                             4.734
                                                                     .667
                                                                            -.238
 14.00
        9.99 13.351
                      1.997
                                    2.862
                     1.459
        9.99 18.506
                                                                           -.209
                               .631
                                             2.300
                                                    2.521
                                                             3.031
                                                                     .242
 13.00
                                                                     .056
                     1.098
                              .627
                                    2.122
                                            1.611
                                                   1.737
                                                             1.212
                                                                           -.150
        9.99 21.561
 12.01
                                            1.275
                     1.135
1.311
                                                             .434
                               .630
                                     1.613
                                                    1.292
                                                                    -.018
                                                                           -.078
 11.00
        9.99 23.305
        9.99
             23.670
                               .450
                                     1.377
                                             1.117
                                                    1.148
                                                             -.094
                                                                    -.013
                                                                           -.137
 10.00
                     1.390
                                                                           -.100
                               .309
                                     1.524
                                             1.147
                                                    1.244
                                                            -.594
                                                                    -.060
        9.99 23.126
 9.01
                                             1.320
                                                                    .006
                                    2.064
                                                    1.491
                                                            -1.318
                                                                           -.087
  8.01 10.00 21.569 1.459
                               .142
                                     1.939
                                             1.375
                                                    1.545
                                                            -1.051
                                                                    -.017
                                                                            -.069
       10.00 19.811
                     1.122
                               .030
  7.01
  6.01 10.00 21.503 -1.064
                                            1.931 1.850
                               .044
                                    2.792
                                                            1.461
                                                                     .087
                                                                            .026
C FILENAME= H910A025.A 1
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=25 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
C 10 : No. of data points
                                                                     v'w'
                                                                            w'u'
Су
              U
                       17
                               W
                                     SIG(u') SIG(v') SIG(w')
                                                             11 7 77 1
        x
 15.99 25.00 10.061
                      1.296
                              .656
                                     3.007
                                             2.942
                                                    3.108
                                                             3.792
                                                                     .006
                                                                           -.409
                                    3.334
 15.01 25.00 13.384
                     1.372
                                                    3.537
                                                             5.037
                                                                     .580
                                                                           -.146
                              .981
                                             3.141
                                             2.692
                                    3.105
                                                                     .219
                                                                            .262
 13.98 25.00 18.096 1.997
                              .641
                                                    2.698
                                                             4.159
 13.01 25.00 20.982
                     1.823
1.681
                                                    2.227
                               .613
                                     2.544
                                             2.331
                                                             2.919
                                                                     .147
                                                                            -.041
                                            1.884
                                    1.836
                                                                            .000
                               .578
                                                            1.133
                                                                     .011
 12.01 25.00 23.131
                                                    1.647
                                                                             .009
 11.01 25.00 23.785 1.596
                              .419
                                     1.598
                                            1.610 1.227
                                                             .053
                                                                    -.063
                     1.597
                                                                            .045
                               .322
                                     1.745
                                             1.474
                                                    1.220
                                                             -.762
                                                                    -.055
 10.01 25.00
             23.147
                                                                    -.011
       25.00
             22.443
                      1.329
                               .224
                                     1.599
                                             1.175
                                                    1.178
                                                             -.451
                                                                            -.036
  9.00
                                                    1.177
                                                             .139
                                                                    -.008
                                                                            .024
 8.00 25.00 22.650
                      .785
                               .139
                                     1.463
                                             1.059
                                                                     .099
                                                                             .357
                               .386
                                             2.664 2.441
                                                             2.573
  7.00 25.00 25.162
                     -.695
                                     3.414
C FILENAME= H910A050.A 1
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=50 mm
  LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
C 11 : No. of data points
                                                                     v'w'
                       V
                               W
                                     SIG(u') SIG(v') SIG(w')
                                                             u'v'
                                                                            w'13 '
Су
        x
               U
               5.461
                      1.180
                               .539
                                    2.244 3.034 3.125
                                                             1.584
                                                                     .023
                                                                           -.563
 22.00 50.01
                     1.858
                                                                     .348
 20.00 50.01 8.297
                              .335
                                    2.989
                                             3.616
                                                    2.814
                                                             3.995
                                                                           -.460
                     2.452
2.399
 18.00 50.01 12.497
                               .507
                                     3.382
                                             3.706
                                                    3.057
                                                             5.864
                                                                     .208
                                                                            .072
                                    3.335
                                                                    -.026
                               .633
                                             3.424
                                                    2.813
                                                             5.571
                                                                            -.372
 15.99 50.01 17.027
 15.01 50.01 18.896 2.125
                                             3.300
                                                    2.732
                                                             5.046
                                                                    -.146
                                                                            -.267
                               .630
                                    3.048
                               .450
                                    2.711
                                             2.946
                                                             3.460
                                                                    -.107
                                                                            -.112
                                                    2.254
 14.00 50.01 20.752 2.017
 13.01 50.01 21.779
                      1.571
                               .513
                                     2.367
                                             2.631
                                                    1.888
                                                             2.228
                                                                    -.364
                                                                            -.065
 12.00 50.01 22.417 1.212
                                             2.305
                                                    1.541
                                                             1.151
                                                                     .037
                                                                            .032
                                    2.064
                               .401
```

```
11.01 50.01 22.970
                       .760
                                 .326
                                       1.865
                                              1.915 1.342
                                                                 .866
                                                                        -.045
                                                                                 .132
 10.01 50.01 23.242
9.00 50.01 24.023
                        .159.
                                 .304
                                       1.951
                                               1.681
                                                      1.250
                                                                1.024
                                                                         .027
                                                                                 .058
                       -.606
                                 .410
                                       3.002
                                               2.029
                                                       1.901
                                                                1.555
                                                                                 .097
                                                                        -.012
C FILENAME= H910A075.A 1
C H2 FLAME; d=9.45, d=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=75 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
  D090894
C 17 : No. of data points
         х
                U
                                 W
                                       SIG(u') SIG(v') SIG(w')
                                                               u'v'
                                                                        v'w'
                                                                                 w'o'
 26.00 75.00
               7.384
                                 .058
                        3.027
                                       2.979
                                              4.200
                                                      2.627
                                                                4.247
                                                                        -.242
                                                                                 .362
 24.00
        75.00
               9.111
                       2.948
                                 .198
                                       3.197
                                               4.127
                                                       2.707
                                                                5.259
                                                                        .304
                                                                                 .254
 22.00 75.00 11.363
                       2.779
                                 .386
                                       3.360
                                               3.944
                                                       2.868
                                                                5.680
                                                                       -.296
                                                                                 .135
 21.00 75.00 12.849
                      2.941
                                .332
                                       3.487
                                               3.813
                                                       2.844
                                                                5.684
                                                                        -.183
                                                                                .335
 20.00 75.00 13.516
                       2.452
                                .484
                                       3.429
                                               3.787
                                                     2.814
                                                                5.763
                                                                       -.295
                                                                                -.454
 18.00 75.00 16.597
16.00 75.00 18.848
                       2.490
                                 .438
                                       3,268
                                              3.578 2.629
                                                                4.870
                                                                      -.221
                                                                                .120
                                               3.138 2.435
2.763 2.240
                       1.920
                                 .536
                                       3.007
                                                                3.793
                                                                       -.134
                                                                                .004
                                                                      -.060
 13.99 75.00 20.661
                      1.213
                                .540
                                       2.817
                                                                3.214
                                                                                .057
 12.00 75.00 22.061
11.01 75.00 22.855
                       .323
                                .337
                                       3.043
                                              2.370 2.068
                                                                        .005
                                                                2.914
                                                                                 .323
                        .240
                                 .378
                                       4.295
                                               2.775 2.758
                                                                                .507
                                                                3.863
                                                                        .265
 10.01 75.00 24.483
                       -.380
                                               2.770
                                 .464
                                       4.788
                                                       3.218
                                                                4.953
                                                                         .516
                                                                                .679
  8.99 75.00 28.676
                       -.669
                                .852
                                       7.402
                                              4.117
                                                       4.754
                                                               13.723
                                                                       1.988
                                                                                2.477
  7.99
        75.00 36.455
                        .335
                                .977 10.813
                                              6.120
                                                      7.304
                                                               35.643
                                                                       3.393
                                                                               2.568
                               2.221 13.499
2.470 14.266
  5.99
        75.00 53.416
                       1.034
                                               8.748 10.353
                                                               61.412
                                                                       7.484 -1.058
                        .793
  5.01 75.00 60.641
                                               9.395
                                                     11.258
                                                               68.798
                                                                       5.766 -5.666
  3.99 75.00 68.597
                        .163
                               2.831 15.261
                                               9.964 11.271
                                                               76.509
                                                                       6.879 -5.052
  3.01 75.00
                               3.348 15.518 10.168 11.598
              77.011
                        -.237
                                                               71.354
                                                                      7.696 -8.987
C FILENAME= H910A150.A 1
  H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=150 mm
С
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
  14 : No. of data points
        x
                II
                                 W
                                       SIG(u') SIG(v') SIG(w')
                                                               11 ' 77 '
                                                                        v'w'
                                                                                w'u'
 26.00 150.00 13.188
                       1.355
                                .369
                                       2.617
                                              2.541
                                                      2.326
                                                                2.842
                                                                       -.183
                                                                                .135
 24.00 150.00 14.244
22.00 150.00 15.443
                      1.266
                                .395
                                       2.682
                                               2.518
                                                       2.314
                                                               2.945
                                                                       -.057
                                                                                 .013
                       1.136
                                .465
                                       2.760
                                                      2.285
                                               2.369
                                                                3.002
                                                                       -.062
                                                                                .026
 20.00 150.00 16.266
                        .880
                                .567
                                       2.890
                                               2.313
                                                       2,296
                                                               3.046
                                                                       -.093
                                                                                .269
 18.00 150.00 17.265
                        .644
                                .405
                                       3.169
                                               2.240
                                                      2.438
                                                               2.923
                                                                        .001
                                                                                .243
                                .476
                                                     2.760
 16.00 150.00 18.813
                        .442
                                       3.699
                                              2.258
                                                               3.345
                                                                        .321
                                                                                .204
 13.99 150.00 20.606
                        .077
                                .637
                                       4.895
                                               2.598
                                                       3.516
                                                               4.734
                                                                         .460
                                                                                .469
 12.00 150.00 26.384
                        .453
                                                      5.138
                                .972
                                       8.880
                                               4.303
                                                              19.307
                                                                       1.576
                                                                                3.483
 10.01 150.00 34.935
                               1.413 10.815
                       1.042
                                               6.055
                                                      7.369
                                                              29.543
                                                                       4.504
                                                                               1.267
  8.00 150.00 43.767
                       1.632
                              1.281
                                      11.461
                                               6.989
                                                      8.054
                                                              36,205
                                                                       4.424
                                                                                .511
  6.00 150.00 50.078
                        .761
                               1.876 11.481
                                               7.318
                                                       8.397
                                                               34.272
                                                                       3.677
                                                                              -1.099
  3.99 150.00 56.517
                        .456
                              1.920 11.402
                                              7.713
                                                       8.120
                                                              30.486
                                                                       4.130 -4.255
  2.00 150.00 62.010
                        .561
                               2.126 10.567
                                               7.794
                                                       7.664
                                                              15.784
                                                                       3.144 -7.148
   .00 150.00 64.458
                       -.241
                               2.260
                                      9.980
                                               7.621
                                                      7.656
                                                                -.326
                                                                       -.021 -10.113
C FILENAME= H910A225.A 1
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=225 mm
  LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
C 14 : No. of data points
                       v
                17
                                W
                                       SIG(u') SIG(v') SIG(w')
                                                               u'v'
                                                                       v'w'
                                                                                w'u'
                               .306
26.00 224.99 13.859
                                      2.756 1.929
                        .643
                                                     2.454
                                                               2.235
                                                                       -.114
                                                                                .010
23.99 224.99 14.085
                        .294
                               .631
                                       2.672
                                              1.825
                                                      2.571
                                                               2.086
                                                                       -.058
                                                                               -.296
21.99 224.99 14.875
                       .108
                               .557
                                       2:759
                                             1.796
                                                      2.410
                                                               2.123
                                                                        .289
                                                                               -.041
20.00 224.99 16.546
                               .493
                        .039
                                      3.350
                                             1.929
                                                      2.741
                                                               2.240
                                                                        .384
                                                                                .439
18.00 224.99 18.138
                        .010
                               .573
                                      4.532
                                              2.252
                                                      3.095
                                                               3.777
                                                                        .516
15.99 224.99 20.981
                               .775
                        .220
                                       7.050
                                              3.288
                                                      3.985
                                                              12.176
                                                                        .830
                                                                               1.064
13.99 224.99 27.766
                      1.428
                               .617
                                      8.757
                                               4.748
                                                      5.439
                                                              19.554
                                                                        .793 -1.811
11.99 224.99 33.291
                      2.023
                               .801
                                      8.879
                                              5.418
                                                      6.434
                                                              19.446
                                                                       3.000
                                                                               .286
 9.99 224.99 36.387
                      1.545
                              1.057
                                      9.131
                                               5.596
                                                      6.431
                                                              20.540
                                                                       2.606 -1.417
 7.99 224.99 40.532
                      1.437
                              1.057
                                      9.160
                                              5.728
                                                      6.362
                                                              18.467
                                                                       3.471 -1.287
 5.99 224.99 43.072
                              1.001
                       1.100
                                      8.722
                                              5.727
                                                      6.376
                                                              13.724
                                                                       3.019 -2.843
 3.98 224.99 46.149
                       .752
                               1.044
                                      8.423
                                              5.810
                                                      6.213
                                                               9.809
                                                                        .323 -2.927
 2.00 224.99 47.194
                        .255
                              1.354
                                      8.497
                                              5.876
                                                      5.942
                                                               7.068
                                                                       1.973 -4.286
```

```
-.618 1.528 -4.175
   .00 224.99 48.258 -.130 1.318 8.323 5.928 5.928
C FILENAME= H910A001.E 1
C H2 FLAME; d=9.45, d=1.2 \text{ mm}; theta=0 deg.; Uj=100, Ua=20, Ue=4 \text{ m/s}; x=1.5 \text{ mm}
  LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C
C D090894
C 8 : No. of data points
                                     SIG(u') SIG(v') SIG(w')
                                                              u'v'
                                                                     v'w'
                      v
                               W
        x
               TT
                                                    .363
                                                                     .002
                                            .200
                                                             .011
                                                                             -007
                              .182
                                     .267
        1.50
              4.138
                      -.225
 26.00
             4.164
                     -.273
-.328
                              .183
                                      .280
                                                                             .011
       1.50
                                              .217
                                                      .386
                                                              .009
                                                                     .006
 24.00
                                                     .384
                                                                     .003
                                                                             .019
 22.00
        1.50
              4.168
                              .206
                                      .275
                                              .203
                                                              .000
              4.109
                                                     .377
                                      .310
                                                             -.008
                                                                     .001
                                                                             .017
                     -.420
                               .215
                                              .207
        1.50
 20.00
                                      .354
                                              .228
                                                     .377
                                                             -.015
                                                                      .003
                                                                             .008
        1.50
              3.916
                     -.527
                              .176
 18.00
                                                     .404
                                      .518
                                              .333
                                                             -.028
                                                                      .007
                                                                            -.002
 16.00
        1.50
              3.522
                      -.631
                               .135
                                      .755
                                                      .564
                                                             -.023
                                                                     .009
                                                                           -.005
                                              - 707
 15.00
        1.50
              3.316
                      -.667
                               .110
                                                                     .195
                                                                           -.110
                                     2.376
                                             2.349 2.058
                                                             2.684
       1.50
              5.913
                     -.761
                              .166
 14.00
C FILENAME= H910A010.E 1
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=10 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894
C
 9 : No. of data points
                                     SIG(u') SIG(v') SIG(w')
                                                              u'v'
                                                                     v'w'
                                                                             พ'น'
               U
                      v
                               W
        x
                                                     .365
                                                                     .001
                                                                             .009
                              .185
                                     .268
                                                              .012
 26.00
       9.99
              4.057
                      -.191
                                              .202
             4.080
 24.00 10.01
                                                     .376
                                                             .007
                                                                     .003
                                                                             .014
                              .186
                                      .276
                                              .200
                     -.223
                                                                     .003
                                      .284
                              .204
                                              .211
                                                     .361
                                                              .006
                                                                             .014
 22.00 10.00 4.070 -.245
             3.974
                                                     .402
                                                             -.002
                                                                      .001
                                                                             .019
 20.00 10.01
                      -.279
                               .180
                                      .306
                                              .240
                                      .427
                                                     .408
                                                             -.007
                                                                     .006
                                                                             .015
                                              .354
 18.00 10.01
              3.884
                      -.327
                               .183
                                            1.022
                                                             .079
                                                                      .054
                                                                            -.070
                      -.400
                              .072
                                      .932
                                                     .809
 15.99 10.01
              3.881
                              .182
                                                             2.713
                                                                      .220
              6.767
                      -.058
                                     2.452
                                            2.218
                                                    2.032
                                                                            -.066
 15.00 10.01
                                             2.926
 14.00 10.01 12.051
                                                    2.981
                                                             5.324
                                                                      .514
                                                                            -.284
                      .058
                              .194
                                     3.435
                                    3.287 2.739
 13.02 9.99 17.365
                     -.423 -.059
                                                    2.927
                                                             4.405
                                                                      .381
                                                                           -.759
C FILENAME= H910A025.E 1
С
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=25 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894
 8 : No. of data points
С
                               W
                                     SIG(u') SIG(v') SIG(w')
                                                              u'v'
                                                                     v'w'
                      V
Су
        x
               11
                                                                     .001
                                                              .011
                                                                             .008
 26.00 25.00
              4.005
                      -.140
                              .175
                                      .269
                                             .208
                                                     .351
             4.018
                              .183
                                                     .368
                                                              .008
                                                                     .004
                                                                             .012
 24.00 25.00
                     -.152
                                      .293
                                              .235
                              .174
                                      .365
              4.037
                                                     .414
                                                              .003
                                                                     -.001
                                                                             .019
 22.00 25.00
                      -.189
                                              . 321
                                                     .452
              4.030
                      -.210
                               .156
                                      .497
                                              .474
                                                              .004
                                                                     -.004
                                                                             .008
 20.00 25.00
                                                                     .008
                                                                            -.016
                     -.243
                               .126
                                      .920
                                             1.050
                                                     .822
                                                              .128
 18.00 25.00
              4.516
                                                                     .278
                     .158
                              .265
                                    2.989
                                                             3.424
              9.378
                                             2.417
                                                    2.409
                                                                            -.367
 16.00 25.00
                               .334
                                     3.326
                                             2.804
                                                    2.883
                                                             4.763
                                                                     .478
                                                                            -.388
 13.99 25.00 16.563
                      -.014
                                            2.487
                     -.588
 12.00 25.00 21.931
                                     2.898
                                                    2.332
                                                             3.512
                                                                     -.114
                                                                            -.702
                               .358
C FILENAME= H910A050.E 1
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=50 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894
С
  8 : No. of data points
                                                              u'v'
                    v
                                                                     v'w'
                                                                             w'u'
Су
        x U
                               W
                                     SIG(u') SIG(v') SIG(w')
                              .173
                                     .495
                                            .521
 26.00 50.01
                                                              .009
                                                                     -.002
                                                                             .008
              4.014
                      -.166
                                                    .362
             4.184
                                                     .432
                                                                     -.021
                     -.148
                                      .658
                                                              .040
 24.00 50.01
                               .159
                                              . 790
 22.00 50.01 4.563
                     -.210
                              .166
                                      .954
                                            1.222
                                                     .699
                                                              .076
                                                                     -.037
                                                                            -.016
                               .148
              6.542
                     -.136
                                     2.102
                                             2.057
                                                    1.634
                                                             1.450
                                                                     -.019
                                                                            -.340
 20.00 50.01
                                                                     .455
       50.01
             10.668
                      .035
                               .281
                                     3.294
                                             2.810
                                                    2.528
                                                             4.435
                                                                           -.328
 18.00
                                                                     .281
 16.00 50.01 15.573
                      -.041
                              .317
                                    3.466
                                             3.162
                                                    2.867
                                                             6.076
                                                                            -.349
                                            3.112 2.617
2.760 2.199
                                                             5.591
                                                                     .280
                                     3.336
                                                    2.617
                                                                            -.767
 13.99 50.01 19.151
                     -.557
                              .491
                                     2.998
                                                             3.911
                                                                     -.257
                                                                           -.651
 12.00 50.01 21.461 -1.138
                              .403
C FILENAME= H910A075.E 1
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=75 mm C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
```

```
C D090894
  9 : No. of data points
                       V
         х
                U
                                 W
                                                                        v'w'
                                       SIG(u') SIG(v') SIG(w') u'v'
                                                                                w'u'
 26.00
        75.00
                5.194
                        -.098
                                .177
                                       1.307
                                              1.620
                                                       .854
                                                                .418
                                                                       -.125
                                                                               -.024
 24.00 75.00
                        .086
               6.701
                                .109
                                       2.150
                                               2.184
                                                       1.564
                                                                1.742
                                                                        .040
                                                                               -.187
 22.00 75.00 9.055
                        .162
                                .174
                                       2.921
                                               2.705
                                                       2.121
                                                                3.838
                                                                        -.008
                                                                                -.340
                        .059
 20.00 75.00 11.928
                                .352
                                       3.285
                                               3.161
                                                       2.446
                                                                        .162
                                                                5.536
                                                                                .197
 18.00 75.00 14.922
                        .024
                                .365
                                       3.493
                                               3.164
                                                       2.591
                                                                6.028
                                                                        .136
                                                                               -.068
 15.99 75.00 17.368
                       -.057
                                .387
                                       3.402
                                               3.163
                                                       2.472
                                                                5.601
                                                                        -.276
                                                                                -.378
                                .434
 13.98 75.00 19.431
                       -.658
                                       3.300
                                               2.825
                                                       2.380
                                                                4.550
                                                                        -.150
                                                                                -.544
                                .356
 11.99 75.00 20.703
                      -1.043
                                       3.466
                                               2.511
                                                       2.162
                                                                3.736
                                                                       -.197
                                                                                -.459
 10.01 75.00 22.745 -1.801
                                .450
                                       4.035
                                               2.347
                                                       2,662
                                                                3.753
                                                                        .345
                                                                                -.174
C FILENAME= H910A150.E 1
C
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=150 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
  D090894
   9 : No. of data points
         х
                U
                                 W
                                       SIG(u') SIG(v') SIG(w') u'v'
                                                                        v'w'
                                                                                w'u'
 26.00 150.00 12.845
                        .923
                                .453
                                       2.789 2.340 2.095
                                                               3.212
                                                                               -.329
                                                                       -.155
                        .707
 24.00 150.00 13.699
                                .621
                                       2.903
                                              2.329
                                                     2.040
                                                               3.363
                                                                               -.350
                                                                       .033
 21.99 150.00 15.031
                        .708
                                .553
                                       2.821
                                              2.236
                                                      2.069
                                                               3.232
                                                                       -.171
                                                                               -.310
 20.00 150.00 15.774
                        .482
                                .600
                                       3.021
                                               2.265
                                                       2.155
                                                                3.214
                                                                        .197
                                                                               -.268
 18.00 150.00 16.715
                        .120
                                .620
                                       3.110
                                              2.048
                                                      2.223
                                                               2.857
                                                                        .198
                                                                               -.198
 15.99 150.00 17.843
                       -.150
                                .759
                                       3.353
                                               2.035
                                                      2.436
                                                               2.610
                                                                        .332
                                                                               -.249
 13.99 150.00 19.280
                      -.640
                                .814
                                       4.053
                                               2.192
                                                      2.859
                                                               2.895
                                                                        .575
                                                                               -.214
                                      6.779
 11.99 150.00 22.967 -1.142
                                .958
                                               3.018
                                                       4.267
                                                               5.932
                                                                       2.001
                                                                               1.061
 10.00 150.00 30.751 -1.102
                                .971 11.799
                                               4.961
                                                       6.557
                                                               22.973 2.529 -1.235
C FILENAME= H910A225.E 1
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=225 mm
  LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894
   8 : No. of data points
        x
                TT
                       77
                                TAT
                                       SIG(u') SIG(v') SIG(w')
                                                               u'v'
                                                                        v'w'
                                                                                w'u'
 24.00 224.99 14.751
                                .701
                        .363
                                       2.699 1.762 2.105
                                                               1.993
                                                                        .193
                                                                               -.227
 22.00 224.99 15.446
20.00 224.99 16.355
                        .136
                                .761
                                       2.893
                                              1.815
                                                      2.252
                                                               1.917
                                                                        .312
                                                                               -.362
                      -.121
                                .734
                                       3.255
                                              1.892
                                                      2.519
                                                               1.932
                                                                        .647
                                                                               -.298
 18.00 224.99 17.343
                      -.407
                                .970
                                       3.747
                                              2.097
                                                      2.755
                                                               2.065
                                                                        .926
                                                                                .058
 16.00 224.99 19.461
                       -.663
                                .836
                                       5.412
                                              2.478
                                                      3.426
                                                               3.677
                                                                               -.691
                                                                       1.383
 13.98 224.99 26.148
                       -.188
                                .883
                                       9.087
                                              4.516
                                                      5.373
                                                              17.095
                                                                       2.148 -1.517
 11.99 224.99 28.479
                                .971 10.307
                       -.364
                                              4.875
                                                      5.436
                                                              21.305
                                                                       1.763 -5.351
 10.00 224.99 34.217
                       -.232
                                .944 10.652
                                              5.866
                                                      6.676
                                                              26.045
                                                                       4.184
                                                                              -5.463
C FILENAME= H910AAX.J 1
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; y=0 mm
  LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
 D090894
C 15 : No. of data points
                        v
                                W
                                                               u'v'
                                                                       v'w'
                                       SIG(u') SIG(v') SIG(w')
                                                                               w'u'
   .00
        1.50 131.512
                        .000
                                .001
                                       5.862
                                              4.915
                                                      4.512
                                                               1.286
                                                                       -.468
                                                                               -.745
   .00
        9.99 130.673
                       -.100
                               -.020
                                       6.099
                                              5.139
                                                      4.679
                                                                       1.608 -.457
                                                               1.325
   .00 20.00 131.064
                       -.149
                               .163
                                       7.035
                                              5.487
                                                     4.950
                                                               1.540
                                                                       .985 -2.055
   .00 30.00 128.996
                       .004
                                .108
                                       7.831
                                              6.396
                                                      5.788
                                                                .227
                                                                       1.258 -2.861
                                                     7.263
  .00 40.01 126.374
                       -.013
                                .296
                                      9.131
                                              7.820
                                                               1.248
                                                                        .055 -3.821
   .00 50.01 120.103
                       .022
                                .188 11.510
                                             9.643
                                                     8.915
                                                               1.325
                                                                      1.872 -7.895
                                .436 13.760 10.941 9.740
.478 14.161 11.604 10.167
                                                                      4.954 -15.811
   .00
       60.01 112.032
                        .224
                                                              -2.350
                                                                     1.854 -16.516
2.634
   .00 70.00 102.820
                        .122
                                                              -5.010
   .00 80.00 95.617
                        .220
                               .237 13.727 10.920
                                                     9.830
                                                              -3.495
                                                                       2.634 -14.290
   .00 90.00 88.453
                                .681 12.971 10.467
.518 12.178 9.957
                        .559
                                                     9.936
                                                              -6.182
                                                                     3.347 -15.853
   .00 100.00 83.341
                        .354
                                              9.957
                                                      9.457
                                                                       .314 -12.619
                                                              -.633
                                                     8.797
  .00 110.00 78.419
                        .072
                               .579 11.143
                                              9.197
                                                                .886
                                                                       -.264 -10.265
   .00 120.00 74.499
                        .093
                                .421 10.948
                                              8.689
                                                     8.487
                                                              -1.518
                                                                       .552 -10.724
   .00 130.00 70.498
                        .244
                                .309 10.133
                                                     8.023
                                                               .996
                                              8.112
                                                                       .378 -7.248
  .00 140.01 67.579
                        .429
                                .155
                                      9.426
                                              7.546
                                                      7.736
                                                                       .004 -5.501
                                                               -.470
  .00 150.00 64.617
                        .257
                               .146
                                     9.153
                                              7.232
                                                      7.426
                                                                       .052 -4.828
                                                               .571
                        .075
   .00 160.01 62.182
                                .155
                                     8.870
                                              6.803
                                                      6.977
                                                                .614
                                                                       .573 -5.556
   .00 170.00 59.249
                        .134
                                .254
                                      8.125
                                              6.563
                                                     6.738
                                                               1.174
                                                                        .022 -6.182
```

```
7.806 6.187
                              -.033
                                               6.187 6.568
6.103 6.401
                        .207
                                                                .963
                                                                        .401 -4.973
   .00 180.00 57.779
   .00 190.01 55.479
.00 200.00 53.964
                                                                        .982 -2.481
                                                               -.007
                        .093
                               -.254
                                       7.857
                                      7.415
                                               5.544
                                                                .836
                                                                        -.203 -4.028
                        .206
                               -.082
                                                       6.109
                                                                1.010
                                                                        .456 -4.756
                                      6.703
                                                       5.713
   .00 225.01 48.959
                        .017
                               -.232
                                               5.224
C FILENAME= H910A001.J 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=1.5 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
  D090894
C 12 : No. of data points
                                                                                            11 1 ^ 2 W 1
                                                                         w'^2v' w'^2u'
                น'^์3
                          v'^3
                                     w'^3
                                             u'^2v'
                                                       v'^2u'
                                                                 v'^2w'
Су
        x
                                  50.087 245.489 833.072 -29.863 29.152 49.309 -19.634
        1.50 1562.036 -382.566
  4.70
                                                                -38.068 30.652 3.701 -63.160
                                  71.065 265.304 333.434
       1.50 2437.059 381.794
  4.49
                                  50.865 -112.384 -470.196
  4.30
       1.50 -642.317
                        -92.079
                                                                  52.704
                                                                            .412 -15.351
                                                                                            63.083
                                    4.738 -306.442 -476.785
                                                                   3.467
                                                                           13.224 25.254
                                                                                            -6,228
        1.50 -945.043 -233.448
  4.00
       1.50 -410.518 -135.516 -11.838 -207.688 -199.746
                                                                  7.477
                                                                         3.741 -36.892
                                                                                           38.152
  3.51
                                                                           9.293 -25.985 -5.937
2.108 -25.897 15.329
       1.50 -286.334
                        -66.701
                                  -25.396 -150.274 -120.081
                                                                 15.252
  3.01
                                   -2.106 -126.313 -123.771
       1.50 -229.818
                        -85.377
-69.088
                                                                  4.527
  2.51
                                                                 12.430 -5.525 -29.304 -14.275
                                    6.301 -116.971 -106.533
        1.50 -231.383
  2.00
                                  10.965 -82.035 -91.560
                                                                 3.778 -6.788 -17.136 11.108
  1.51
       1.50 -168.110 -39.530
                                            -57.436 -68.811
-30.021 -52.971
                                     7.722
.450
                                                                   3.093
                                                                          -1.445 -21.908
                                                                                             9.129
       1.50 -140.013 -29.633
  1.01
                                                                   3.442 -2.930 -15.439
                                                                                             2.688
               -89.287
                          -2.172
   .51
        1.50
                        -1.078
                                                                 3.096 2.482 -12.272 -1.265
             -78.508
                                             4.033 -55.670
                                     5.151
   .00
        1.50
C FILENAME= H910A010.J 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=10 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
C 10 : No. of data points
                                                                 v'^2w' w'^2v' w'^2u' u'^2w' -35.092 107.965 138.361 -48.609
                u'^3 v'^3
                                             u'^2v'
                                                       v'^2u'
                                    w'^3
                                  134.321 927.474
  5.50 10.00 1628.901
                         622.678
                                                       782.019
  5.00 10.00 1884.693 543.053
                                  138.645 717.447 636.102
                                                                 5.459 151.495 156.292 50.796
                                  27.694
  4.51 10.00 736.676 216.092
                                                                -48.765 58.425 69.308 -63.859
                                             35.173 105.835
  4.01 10.00 -1052.929 -308.546
                                                                                            88.925
                                                                            .444 -161.183
                                    32.980 -613.052 -484.723
                                                                 57.862
                                                                 -4.426 -50.519 -63.276
                                  -18.407 -576.754 -453.430
                                                                                            9.999
  3.41 10.00 -1153.586 -370.605
                                  -1.988 -179.257 -150.112
                                                                  24.199 -27.839 -34.101
                                                                                            28,288
       9.99 -369.418 -158.914
  2.70
                                   3.913 -114.534 -83.993
9.018 -69.181 -70.791
                                                                 4.720
                                                                          -2.926 -25.920
                                                                                            15.248
                        -60.805
  2.01 10.00 -245.885
                                                                  6.718 -8.043 -20.201
                        -47.499
  1.30 10.00 -155.232
                                                                                             4.518
                                                                   -.666 2.284 -16.251
  .62 10.00 -137.494
                                  -11.707
                                            -40.983 -59.452
                                                                                            12.703
                        -19.169
                                  13.853 1.461 -61.079
                                                                  5.134 -2.807 -8.854
   .01 10.00 -92.551
                        -6.741
C FILENAME= H910A025.J_2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=25 mm
  LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
С
C D090894
C 12 : No. of data points
                           v1^3
                                    w'^3
                                             u'^2v'
                                                       v'^2u'
                                                                 v'^2w' w'^2v' w'^2u'
                                                                                            u'^2w'
С У
               u'^3
         x
                                                               26.013 117.589 229.569 -17.412
  7.00 25.00
              829.139
                        268.345
                                  68.860 413.198 363.521
 6.01 25.00 1386.980 427.715 77.129 615.419 560.900 -5.456 118.938 181.441 9.312 5.51 25.00 1507.366 523.400 8.018 754.207 664.117 21.976 83.152 181.815 -23.634 5.01 25.00 1607.587 479.055 -142.991 667.429 622.570 -45.080 146.553 124.339 -151.453
  4.50 25.00 1211.457 246.965 26.761 323.925 336.570 27.604 51.902 -7.717 37.545
4.01 25.00 -263.515 5.718 -128.188 -226.056 -163.980 -25.763 -77.398 -221.657 5.243
 4.01 25.00 -263.515 5.718 -128.188 -226.056 -163.980
3.41 25.00 -1180.836 -242.840 -135.294 -644.693 -580.470
                                                               36.908 -17.224 -142.556 -20.790
                                   23.277 -856.518 -700.881 19.852 28.977 -137.165 17.710
  2.70 25.00 -1812.605 -525.707
                                  -14.955 -303.576 -304.230
2.449 -131.384 -134.855
  2.01 25.00 -721.307 -258.486
                                                                 41.419 -32.670 -77.626
                                                                 -13.735 -19.483 -23.200 -8.653
       25.00 -244.235 -117.180
  1.29
                                                                 4.023 -5.282 -15.735
                                                                                           1.806
   .62 25.00 -120.980
                        -44.730
                                    14.749
                                            -44.750 -80.036
                                              4.003 -56.919
                                                                          -.154 -17.931
                                                                   1.700
   .01 25.00 -81.419
                        -2.124
                                     6.030
C FILENAME= H910A050.J_2
C
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=50 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
C 11 : No. of data points
                                                                 v'^2w'
                                                                           w'^2v' w'^2u'
                                                       v'^2u'
                                                                                           11 1 ^ 2 W 1
     x u'^3
                         v'^3
                                    w'^3
                                             u'^2v'
Су
                                  37.100 194.729 179.374
                                                                 2.402 44.291 134.218 -20.876
               466.255 136.088
  8.80 49.99
```

```
    8.22
    49.99
    456.533
    169.355
    58.912
    241.002
    222.303
    22.540
    56.344
    135.537
    8.450

    7.01
    49.99
    833.647
    249.858
    8.604
    375.224
    327.119
    -24.243
    127.320
    182.563
    -27.584

  6.00 49.99 1235.980 405.349 -101.261 562.325 519.095 8.078 110.716 210.989 -53.178 5.01 49.99 1659.615 496.288 -84.271 632.151 616.590 43.380 116.778 48.729 -113.415
  5.01 49.99 1659.615 496.288 -84.271 632.151 616.590 43.380 116.778 48.729 -113.415
4.00 49.99 778.382 209.363 -237.581 222.756 194.256 -14.063 85.042 -95.282 -96.964
  2.72 49.99 -1202.364 -278.238
2.00 49.99 -1707.252 -418.185
                                           5.084 -552.570 -481.321 -34.290 -12.726 -263.861
                                          -10.981 -757.963 -729.538 41.395 -47.972 -393.221
30.201 -683.661 -775.475 66.513 -40.300 -294.940
   1.30 49.99 -1960.485 -255.059
    .60 49.99 ~1223.460 -151.798
                                          36.132 -258.810 -618.087 61.448 -10.199 -146.456 55.876
    .00 49.99 -1087.148
                              28.435
                                           9.674 110.823 -580.952 11.205 -22.326 -218.811
C FILENAME= H910A075.J 2
C H2 FLAME; d=9.45, d=1.2 mm; theta=0 deq.; Uj=100, Ua=20, Ue=4 m/s; x=75 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
C 12 : No. of data points
                    u'^3
                                 v'^3
                                          w'^3 u'^2v' v'^2u' v'^2w' w'^2v' w'^2u'
-3.386 127.082 117.636 -5.829 47.466 129.293
          x
                                                                                                      w'^2u'
                                                                                                                 11 1 ^ 2 w 1
 11.00 75.00
                   351.077
                                81.373
                                                                                                                 -9.410
  9.49 75.00
8.23 75.00
                 357.516 119.672 17.079 169.400 171.885 12.979 47.279 115.396 -34.371 444.495 199.563 -14.902 239.037 242.680 -.035 92.002 136.433 -2.801 849.833 278.370 10.607 377.976 345.766 21.623 68.222 62.182 -34.363
  8.23 75.00 444.495 199.563
7.01 75.00 849.833 278.370
                                                                                21.623
                                                                                                      62.182 -34.363
  5.99 75.00 1068.688 364.761 -89.555 441.560 453.568
                                                                                 4.984 120.430 86.940 -107.747
  5.00 75.00 857.188 337.500 21.326 320.210 378.324 -27.151 91.160 -8.857 -126.833 3.99 75.00 656.792 236.892 -240.132 162.667 194.019 -17.016 110.329 35.735 -103.193 2.72 75.00 -96.111 118.330 -169.995 -140.028 -96.066 -5.739 12.898 -185.387 48.807 2.00 75.00 -417.963 -150.258 -127.887 -300.325 -421.355 13.946 16.266 -178.949 -55.781
         75.00 -793.852 -98.504 -29.836 -275.895 -498.250 -75.794 -2.111 -186.231 50.128
75.00 -738.124 -17.550 -46.159 -142.388 -488.847 33.365 -16.025 -117.758 108.125
  1.30
    .61 75.00 -738.124
                                                                              43.564
                                -6.256 -5.594 102.609 -532.337
    .00 75.00 -736.543
                                                                                           5.272 -185.678
C FILENAME= H910A150.J_2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=150 mm C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C 15 : No. of data points
                                                      u'^2v' v'^2u'
                               v'^3
          x u'^3
                                             w'^3
                                                                              v'^2w' w'^2v'
                                                                                                     w'^2u'
                                                                                                                 u'^2w'
 16.00 150.00 176.555

    47.265
    72.829
    1.841
    19.679
    68.415

    45.558
    70.859
    .689
    38.283
    71.176

    88.451
    86.198
    10.507
    54.390
    61.585

                                                                                                     68.415 -4.401
                                40.168
                                            16.919
                                                        47.265
 13.99 150.00 147.179
                              55.646 -15.253
                                                                                                                  9.025
 11.99 150.00 156.735
                             57.844 75.617
                                                                                                                 -7.867
                                                        84.020 100.775 -10.504 32.138 23.611 -8.276
91.190 96.403 -6.614 42.950 31.114 -10.953
65.224 82.230 -4.469 40.777 -4.670 -31.476
 10.00 150.00
                   128.487
                                69.212
                                           -14.046
  9.00 150.00 185.200
                                78.924 -13.905
  8.01 150.00 160.377
                              75.197
                                            1.314
                    166.506 80.946
72.178 45.256
                                         -16.080 70.561 96.569 -10.024 19.465 -25.967 -14.230
15.107 9.241 44.767 -3.088 12.081 -35.209 9.289
-30.844 -38.578 21.582 -2.356 -.076 -71.407 -3.732
  7.01 150.00
                  166.506
  5.99 150.00
  5.00 150.00 -11.005 24.761
                   37.112
  3.99 150.00
                                5.632
                                                                                -7.976 -12.553 -40.368 15.244
                                            -.834 -23.388 19.143
  3.00 150.00
                  -29.489
                                13.553
                                            12.117
                                                      -46.315
                                                                    -6.719
                                                                                -8.348 -16.073 -54.427
                                                                                                                  2.712
                                            13.298 -43.363 -10.249 -15.657
  2.01 150.00 -25.123 -12.986
                                                                                           -3.760 -67.558
                                                                                                                 19.394
  1.01 150.00
                  -23.057
                                                      -34.052 -45.706
                                1.690
                                          -17.297
                                                                                8.879
                                                                                            8.063 -65.288
                                                                                                                 -6 989
                 -31.389
                                           4.108 -18.373 -54.384
9.560 -12.355 -35.326
   .51 150.00
                                -2.781
                                                                                -5.547 -12.615 -58.013
                                                                                                                 18.273
   .00 150.00 -170.792 -17.533
                                                                                 9.382
                                                                                           -8.847 -69.756
                                                                                                                 8.618
C FILENAME= H910A225.J 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=225 mm
  LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
C 13 : No. of data points
                   u'^3
                                v'^3
         x
                                            w'^3
                                                      u'^2v'
                                                                   v'^2u' v'^2w'
                                                                                          w'^2v'
                                                                                                      w'^2u' u'^2w'
                                                                 27.957
 24.00 225.00
                    68.766
                                15.188
                                                                                          -1.691
                                            19.442
                                                        19.195
                                                                              -1.001
                                                                                                      25.546 -3.330
 21.99 224.99
                   84.776
                                18.335
                                            -5.061
                                                        27.797
                                                                     35.605
                                                                                 5.759
                                                                                             7.527
                                                                                                      29.779
                                                                                                                 -4.377
                                                                                                      29.565 -17.184
 20.00 224.99
                  80.578
                               23.507
                                           -9.003 22.509
                                                                 40.002
                                                                                         11.449
                                                                                  5.552
                 129.026
18.00 224.99
                               25.468
                                            3.306 38.535 42.537
                                                                                -1.481
                                                                                           9.702
                                                                                                      23.145
                                                                                                                 6.427
                                                                   34.178
15.99 224.99
                    99.259
                                29.280
                                                                                          11.350
                                           -11.734
                                                        22.955
                                                                                -1.376
                                                                                                      27.096
                                           -.011 20.756
                                                                                                                 -4.537
13.99 224.99
                               25.387
                    28.924
                                                                                          13.665 10.780 -4.073
14.451 12.731 15.161
                                                                    33.624
                                                                                -2.393
11.99 224.99 110.227
                                41.725 -35.198 46.378 54.909
                                                                                -6.874
                 -1.512
10.00 224.99
                               15.017
                                            .033 -1.737 15.423
                                                                                1.935
                                                                                          5.208 -10.260
                                                                                                                 -2.752
                                                                 6.015
                                15.361
 8.00 224.99
                   -3.664
                                          -12.087
                                                        -3.881
                                                                                -4.940
                                                                                             2.586 -14.696
                                                                                                                 -4.459
 5.99 224.99 -21.806 15.942 -4.566 -16.928
                                                                      .859
                                                                                  .872
                                                                                             2.871 -18.660
                                                                                                                   6.156
```

```
2.028 -2.616 -6.873 -24.804
                                                                                    5.811
                               12.905 -10.967
  3.98 224.99
             -44.285
                       -2.668
                                                           2.410 -4.164 -17.802 15.406
                       -2.023 -7.264
                                          -.283 -3.836
             -30.515
  2.00 224.99
                                            .283 -7.339
                                                                     2.750 -18.681
                                  9.005
                                                           -2.724
              -1.164
                         6.772
   .01 224.99
C FILENAME= H910A001.A 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=1.5 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
C 11 : No. of data points
                                                           v'^2w'
                        v'^3
                                                  v'^2u'
                                                                    w'^2v'
                                                                            w'^2u'
                                                                                    11 1 ^ 2 W 1
               u'^3
                                  w'^3
                                          u'^2v'
        х
                                                  -8.605
                                                           1.131
                                                                   -1.446 -1.339
                                  1.477
                                          -9.625
 13.50
       1.50
              -10.120
                        -9.827
                                                             .077
                                                                                     -.970
                                                  -4.586
                                                                    -1.623 -1.002
      1.50
              -9.595
                        -4.839
                                  -.856
                                         -5.433
 13.00
                                  .013
                                          -1.854
                                                  -1.404
                                                             -.146
                                                                     -.735
                                                                             -.462
                                                                                     - . 535
                       -1.178
       1.50
              -4.456
 12.49
                                         -1.283
       1.50
1.50
                                   .390
                                                    -.952
                                                             -.091
                                                                     -.334
                                                                             -.367
                                                                                     -.137
 12.00
               -2.474
                         -.730
                                                             .011
                                  .233
                                          -.871
                                                   -.559
                                                                     -.079
                                                                             -.125
                                                                                     -.153
 11.19
              -1.390
                        -.333
                                                                              .028
                                                                                     -.006
                                   .096
                                          -.450
                                                   -.265
                                                             .019
                                                                    -.046
       1.50
               -.496
                         -.219
 10.40
                                          .012
                                                                     .011
                         .065
       1.50
                                  -.054
                                                   -.245
                                                             -.058
                                                                              .044
                                                                                     -.079
 9.60
               -.230
                                                                             -.192
                                  .032
                                                                                     -.146
                                            .578
                                                   -.452
                                                             .019
                                                                      .232
 8.20
       1.50
               -.873
                         .424
       1.49
                                                             .091
                                                                     .320 -.681
                                  -.052
                                          2.044
                                                   -1.213
                                                                                      .025
              -4.175
                         1.129
 6.99
                                                                              .296
                                           .947
                                                              .175
                                                                      .043
                                                                                     -.197
                                  .255
               -4.833
                         -.215
                                                   -.147
 6.01
       1.50
                                                             -.017
                                                                     -.040
                                                                              .304
                                                                                      .103
              3.104
                         -.017
                                   .267
                                           -.951
                                                    .192
 5.51
       1.50
C FILENAME= H910A010.A 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=10 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
  9 : No. of data points
               น'^3์
                        v'^3
                                         u'^2v'
                                 w'^3
                                                  v'^2u'
                                                           v'^2w'
                                                                    w'^2v'
                                                                           w'^2u'
                                                                                    11 1 ^ 2 w !
С
  У
        х
                                                                           1.114
                1.389
                                                           -.440
                                                                   -1.588
                                                                                    -1.042
 14.00
                        -7.563
                               -1.638
                                        -2.738
                                                  -3.528
      9.99
                               -1.018
                                          -6.090
                                                  -5.153
                                                             .201
                                                                    -3.376
                                                                            -2.023
                                                                                    -1.101
 13.00
      9.99
              -8.091
                       -6.965
                                 .005
                                                             -.126
                                                                    -1.223
                                                                            -.587
                                                                                     -.268
               -2.832
                        -2.010
                                         -1.853
                                                   -1.475
 12.01
       9.99
                                                                                      .037
       9.99
               ~.810
                         -.473
                                   .118
                                          -.630
                                                   -.571
                                                             -.059
                                                                     -.254
                                                                            -.155
 11.00
                                                   -.394 -.051
                                                                      .019
                                          -.018
                                                                             -.015
                                                                                     -.078
 10.00
      9.99
               -.125
                         .168
                                 -.002
                                  .056
                                            .794
                                                    -.601
                                                             .039
                                                                      .280
                                                                             -.339
                                                                                     -.081
 9.01
       9.99
               -1.419
                         .602
                                                                      .500
 8.01 10.00
                         .856
              -3.595
                                  -.051
                                          1.747
                                                   -1.115
                                                             -.077
                                                                             -.758
                                                                                     -.279
                                                                      .192
                                                             .090
                                          -.470
                                                                             .008
                                                                                     -.021
 7.01 10.00
               1.177
                          .720
                                  .392
                                                    .098
                                          2.706
                                                    -.116
                                                              .356
                                                                     1.002
                                                                             -.361
                                                                                      .125
 6.01 10.00
               1.591
                         1.054
                                   . 921
C FILENAME= H910A025.A 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=25 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
C 10 : No. of data points
Су
                                         u'^2v'
                                                           v'^2w'
              u'^3
                       v'^3
                                 w'^3
                                                 v'^2u'
                                                                    w'^2v' w'^2u'
                                                                                    11 1 ^ 2 w 1
       х
                                                            .096
               5.763
                               15.198
                                                                    1.539
                                                                            -.118
                                                                                      .904
 15.99 25.00
                        4.470
                                         4.294 4.118
                                 31.928
                                            .691
                                                    .379
                                                             -.080
                                                                    -1.623
                                                                             -.586
                                                                                    -2.309
 15.01 25.00
               2.487
                        -1.315
                                 .864
                                          -6.833
                                                  -5.385
                                                             -.763 -3.474 -2.165
                                                                                     -.759
 13.98 25.00
              -9.824
                       -6.627
                                  .076
                                                             -.482 -3.190 -2.581
                                                                                     -.353
              -9.883
                       -6.685
                                         -7.019     <del>-</del>5.834
 13.01 25.00
                                  .490
                                                                    -1.132
                                                                             -.712
 12.01 25.00
                       -1.530
                                          -1.960
                                                   -1.983
                                                             .411
                                                                                     -.124
              -2,223
                                          .173
                                                                             -.253
                                                                                     -.136
 11.01 25.00
              -1.289
                        -.198
                                   .092
                                                   -1.306
                                                             -.063
                                                                     -.305
                                  .039
                                           .782
                                                    -.870
                                                             .018
                                                                      .124 -.161
                                                                                     -.122
 10.01 25.00
              -1.489
                         .676
                                          -.200
                                                    .015
                                                                                      .068
               .164
                         .202
                                                             -.010
                                                                      .071
                                                                              .005
                                  -.042
 9.00 25.00
                                                                             -.147
                                                                                     -.130
  8.00 25.00
                -.680
                          .130
                                  -.054
                                           -.103
                                                    -.120
                                                              - 007
                                                                      .107
                                           9.741
                                                   8.655
                                                              .528
                                                                      .244
                                                                             3.068
                                                                                    1.397
 7.00 25.00
                                  5.151
             18.837
                         4.564
C FILENAME= H910A050.A 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deq.; Uj=100, Ua=20, Ue=4 m/s; x=50 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
C 11 : No. of data points
                        v1^3
                                          u'^2v'
                                                                    w'^2v'
                                                                            w'^2u'
                                                                                    u'^2w'
                                 w'^3
                                                   v'^2u'
                                                           v!^2w!
Су
             u'^3
        x
                                 35.236
                                          5.314
                                                   4.822
                                                            .012
                                                                   2.974
                                                                             .421
                                                                                    -.163
 22.00 50.01
               5.214
                        16.415
                                                                     4.356
                                                                             1.350
                                           8.093
                                                    9.962
                                                              . 834
                                                                                      .883
 20.00 50.01
               11.089
                        18.201
                                 6.274
 18.00 50.01
                                 4.978
                                           .810
                                                   2.015
                                                             -.953
                                                                     .548
                                                                            1.812
                                                                                    -1.094
                .775
                        8.450
                                                            .792
                                                                                     .985
             -16.610
                                                   -9.904
                                                                    -6.485
                                                                            -3.684
                                  3.604
                                         -11.235
                        -5.901
 15.99 50.01
                                                              .907 -5.975 -4.652
 15.01 50.01
              -15.110
                        -7.847
                                  5.811
                                         -12.135
                                                  -12.109
                                                                                      -.481
             -16.038
                                   .860
                                        -11.668
                                                  -11.942
                                                              .534 -5.544 -4.321
                                                                                      .495
 14.00 50.01
                       -8.647
```

```
.943
.518
 13.01 50.01
               -9.561
                          -5.671
                                              -7.829
                                                        -7.921
                                                                   1.047
                                                                          -3.185
-1.958
                                                                                             .138
                                                                                   -2.424
 12.00 50.01
                -4.737
                          -4.902
                                            -3.980
                                                        -5.251
                                                                   -.039
                                                                                    -1.273
                          -2.105
                                                                                              .169
 11.01 50.01
10.01 50.01
                                      .365
                -3.691
                                              -2.395
                                                        -2.354
                                                                   -.169
                                                                           -.919
                                                                                    -.377
                                                                                              -.334
                -5.175
                           -1.806
                                       .159
                                              -1.655
                                                        -2.106
                                                                           -.489
                                                                   -.051
                                                                                     -.536
                                                                                              -.208
                           .413
  9.00 50.01
                 -6.929
                                     2.297
                                              1.273
                                                         -.870
                                                                    .014
                                                                            .094
                                                                                    -1.063
                                                                                              .898
C FILENAME= H910A075.A 2
С
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=75 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY. C D090894
C 17 : No. of data points
                u'^3
                           v1^3
Су
                                    w'^3
         х
                                              u'^2v'
                                                        v'^2u'
                                                                         w'^2v'
                                                                                   w'^2u'
                                                                v'^2w'
                                                                                            u'^2w'
 26.00 75.00
                                             12.070
                14.451
                           19.985
                                      .042
                                                      7.392 3.751
                                                                         5.547 2.493
                                                                                            .082
                                                                         3.141
 24.00 75.00
                 9.198
                                                                 1.578
                          21.233
                                                                                  2.304
                                     1.646
                                               7.749
                                                         4.803
                                                                                              -.290
                                                        1.913
 22.00 75.00
                5.050 15.911
                                    2.364
                                               6.226
                                                                   -.341
                                                                            .643
                                                                                      .712
                                                                                              .102
 21.00 75.00
20.00 75.00
                                    1.306
                  .364
                          6.333
                                              1.187 -3.936
                                                                   -.885
                                                                            -.723
                                                                                     1.274
                                                                                              -.754
                1.121
                          11.579
                                  3.565
1.042
                                             1.381 -2.665
-7.247 -11.518
                                                                   .887
                                                                            .032
                                                                                     .265
 18.00 75.00 -12.087
                          -4.766
                                                                  -.564 -5.115 -2.610
.882 -4.938 -2.338
-.052 -3.109 -1.970
                                                                                             1.411
 16.00 75.00 -13.229 -3.612 2.522 -8.666 -10.366
 13.99 75.00 -11.436
12.00 75.00 -16.344
                          -3.672 1.811 -6.670 -6.336
                                                                                              .488
                                    .912 -4.481
.292 14.590
                          -3.485
                                             -4.481 -3.617
                                                                  -.432 -1.464 -1.721
                                                                                             -.564
 11.01 75.00
                          7.353
                 -.623
                                                         1.655
                                                                  -.405 5.950 -1.575
                                                                                             -.077
  -.073 21.796 12.023
 10.01 75.00
  3.99 75.00 806.435 332.287 -94.775 262.985 255.678 -36.053 85.109 -22.027 -9.691 3.01 75.00 544.053 310.744 -240.650 112.648 83.569 59.941 91.491 -161.282 -33.843
                                                                  59.941 91.491 -161.282 -33.843
                                                      83.569
C FILENAME= H910A150.A 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=150 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
C 14 : No. of data points
                                  w'^3 u'^2v'
.936 1.434
                        v'^3
        x u'^3
                                                      v'^2u' v'^2w' w'^2v' w'^2u' u'^2w'
                         4.230
2.572
2.440
                                                     .795
 26.00 150.00
                 1.081
                                                                -.135
                                                                          .437
                                                                                   .000
                                                                                           -.180
                                              .769
 24.00 150.00
                .291
.671
                                      .854
                                                                   .197
                                                                           .958
                                                         -.047
                                                                                    -.182
                                                                                             -.140
                                                .119
                                      .725
 22.00 150.00
                                                         .597
                                                                  -.338
                                                                            .293
                                                                                    -.264
                                                                                             .230
                          2.769
2.538
                                    .583 1.531 1.948
1.807 3.576 2.259
-.430 8.757 5.398
 20.00 150.00
                 3.837
                                  1.807
                                                                 -.387
.254
                                                                         1.183 1.062
                                                                                             .-.386
              12.235
 18.00 150.00
                                                                         3.077
                                                                                    3.390
 16.00 150.00
                          4.926
                29.935
                                                                    .196
                                                                           3.851
                                                                                    8.196
13.99 150.00 136.151 10.020 5.877 26.343 20.878 2.925 9.147 35.038 1.149 12.00 150.00 641.860 75.019 20.726 186.612 133.900 12.230 41.069 130.059 14.519 10.01 150.00 463.331 117.523 -16.708 186.317 170.730 6.736 82.872 145.401 -39.628 8.00 150.00 112.704 115.886 -26.546 78.417 112.892 8.740 70.762 87.079 -22.541
                                                                                             - 619
                          67.399 -69.327 -6.619
55.858 -47.857 -70.630
  6.00 150.00
               -98.463
                                                      46.711
                                                               32.500 35.301 -16.051
                                                                                            8 832
  3.99 150.00 -232.690
                          34.266 -58.709 -97.961 -135.850 -.890
34.718 -24.355
                                                                          -.886 -65.234 12.723
  2.00 150.00 -274.785
                                                                          -5.114 -94.865
                                                                                            47.819
   .00 150.00 -312.290
                          34.718 -24.355 5.838 -131.566
                                                                 10.724 -10.352 -58.159 87.618
C FILENAME= H910A225.A 2
C H2 FLAME; d=9.45, d=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=225 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
C 14 : No. of data points
                u'^3
                          v'^3
                                    w'^3
        х
                                             u'^2v'
                                                       v'^2u'
                                                                                   w'^2u' u'^2w'
                                                                 v'^2w'
                                                                         w'^2v'
26.00 224.99
                10.404
                          2.712
                                                     2.251
2.773
                                                                -.249
-.376
                                   1.544
                                             2.542
                                                                         1.878
                                                                                    2.861
                                                                                           -1.892
                         2.153
 23.99 224.99
                11.900
                                  4.267
                                                                         2.104
                                             3.260
                                                                                    1.904
                                    2.573
3.229
                                                                                            -.962
21.99 224.99
                10.578
                           1.820
                                                       1.847
                                                                  -.078
                                                                         1.366
                                                                                    2.042 -.481
                                                                         2.839
20.00 224.99
                32.165
                          2.004
                                                        5.232
                                                                  -.185
                                                                                    7.571
                                                                                            -.011
18.00 224.99 125.142
                                    4.020 22.748 15.613
                          6.206
                                                                  -.332
                                                                           9.955
                                                                                   26.862
                                                                                             3.579
15.99 224.99 443.888
13.99 224.99 308.127
                          39.644 8.411 113.133 69.927 72.701 8.657 95.962 94.187
                                                                 3.981 23.470 70.004 16.748
                                    8.657 95.962 94.187
5.066 11.894 49.567
                                                                 -1.532
                                                                         37.167 86.052
                                                                                           -8.029
11.99 224.99
              48.722 58.825
                                                                                  43.050 -7.941
19.109 -25.938
                                                       49.567
                                                                  5.108
                                                                          30.872
 9.99 224.99
               32.189 42.570 -15.959
                                            11.495 38.183
                                                                -1.880
                                                                         24.624
 7.99 224.99 -105.125
                          26.743
                                   -6.793 -37.053 11.684
14.128 -27.152 -12.824
                                                                         23.747 -8.546 15.040
                                                               9.622
 5.99 224.99 -24.205
                          12.309
                                                                1.056
                                                                          3.591 -27.057 29.185
```

```
-4.028 11.649 -21.843
3.486 -1.081 -41.546
1.674 -10.700
                                        -24.606 -34.397
-39.740 -42.751
                      -1.126 -18.155
8.407 -5.832
                                                                                     22,491
  3.98 224.99 -119.602
                                                                                     18.667
  2.00 224.99 -179.148
                               -17.867
                                          -7.455 -46.711
                                                             1.674 -10.709 -36.749
                        -6.803
   .00 224.99 -145.987
C FILENAME= H910A001.E 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=1.5 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894
  8 : No. of data points
              u'^3 . v'^3
                                  w'^3
                                          u'^2v'
                                                   v'^2u'
                                                           v'^2w'
                                                                    w'^2v'
                                                                           w'^2u'
                                                                                     u'^2w'
Су
        x
                                         .001
                                 .003
                                                   .001
                                                            .002
 26.00
                         .002
                                                                                     .001
       1.50
                .005
                                                                     .001
                                                                              .002
                                            .001
                                                     .000
                                                              .002
                                                                      .001
                                                                              .000
                                                                                       .001
 24.00
        1.50
                .003
                          .002
                                   .002
                                  .003
                                            .000
                                                     .001
                                                             .001
       1.50
                .003
                         .000
                                                                      .000
                                                                              -.001
 22.00
                                            .003
                                                              .001
                                                                      .002
                                  .005
                                                                              .000
                         .000
                                                    -.001
                                                                                       .003
 20.00
       1.50
                .000
      1.50
                                            .007
                                   .005
                                                    -.003
                                                              .002
                                                                              -.002
                                                                                       .003
 18.00
                -.017
                          .001
                                            .008
                                                                      .001
                                                                              .002
                                                                                       .001
                         -.001
                                   .009
                                                    -.006
                                                             -.001
 16.00
        1.50
                -.054
                                                             .007
                                                                                       .003
                         .048
                                  -.017
                                            .036
                                                   -.057
                                                                      .018
                                                                              -.036
 15.00
       1.50
                -.100
                         9.204
                                  .525
                                         9.330
                                                   8.692
                                                              .705
                                                                     1.502
                                                                              2.628
                                                                                       .193
 14.00
       1.50
             14.580
C FILENAME= H910A010.E 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=10 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C 9 : No. of data points
                         v'^3
              u'^3
                                  w'^3
                                                  v'^2u'
                                                          v'^2w' w'^2v' w'^2u'
Су
                                          u'^2v'
        х
                .005
                         .002
                                  .000
                                          .001
                                                   .001
                                                                                    .001
 26.00 9.99
                                                            .000 .000 .001
                                  .003
                                            .001
                                                     .001
                .005
                         .001
                                                              .001
                                                                      .001
                                                                              .004
                                                                                       .001
 24.00 10.01
                .004
                                            .001
                          .001
                                   .005
                                                     .000
                                                              .002
                                                                      .002
                                                                              .002
                                                                                       .002
 22.00 10.00
 20.00 10.01
                                   .005
                                            .001
                                                                      .000
                .002
                         .002
                                                    -.001
                                                              .001
                                                                              -.001
                                                              .001
                                                                     .001
                                  .006
                                            .004
                                                                             -.003
 18.00 10.01
               -.014
                         .005
                                                    -.005
                                                                                      -.002
 15.99 10.01
15.00 10.01
                                   .051
                                            .143
                                                    .166
                                                              .088
                                                                              -.017
                                                                                       .056
               -.040
                          .177
                                                                      .145
                                                  7.588
                                   .352
                                          8.069
                                                              .594
                                                                     2.744
                                                                              3.558
                                                                                       .505
              13.741
                        8.513
                                          4.974 5.625
               7.910
                        6.912
                                 -.830
                                                           1.418
                                                                      2.577
                                                                             3.797
                                                                                      1.658
 14.00 10.01
                       -1.014
                               -2.164
                                          -1.853
                                                    -.848
                                                             .376
                                                                     -.661
                                                                           -1.900
                                                                                      1.238
 13.02 9.99
              -3.732
C FILENAME= H910A025.E 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=25 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894
 8 : No. of data points y x u'^3
C
                       v'^3
                                  w'^3
                                          u'^2v'
                                                   v'^2u'
                                                            v'^2w'
                                                                    w'^2v'
                                                                             w'^2u'
С
                                                                           .001
                .005
                                                            .001
                                                                                    .001
                         .001
                                  .005
                                                   .001
 26.00 25.00
                                          .001
                                                                     .001
                .004
                         .002
 24.00 25.00
22.00 25.00
                                   .001
                                            .000
                                                     .000
                                                              .000
                                                                      -.001
                                                                              .000
                                                                                       .000
                                            .003
                                                              .000
                                   .002
                                                                      .002
                                                                              -.001
                                                                                      .001
                .001
                          .006
                                                    -.001
                                  .005
                                            .004
                                                                     .007
 20.00 25.00
               -.026
                         .017
                                                    -.012
                                                              .002
                                                                             -.001
                                                                                      - 000
                .206
                          .372
                                            .196
                                  -.147
                                                     .192
                                                             -.010
                                                                      .126
                                                                              .036
                                                                                      -.042
 18.00 25.00
                                                             .693
                                          7.940
      25.00
              16.468
                         7.959
                                  -.137
                                                    6.863
                                                                      2.031
                                                                              3.462
                                                                                      .291
 16.00
 13.99 25.00
              -1.714
                         -.375
                                  -.754
                                           -.832
                                                    -.776
                                                             -.419
                                                                      .661 -1.264
                                                                                      -.467
                                                           -.421 -2.173 -3.010
                                          -5.182 -3.815
                                                                                      . 514
 12.00 25.00
             -10.744
                      -3.179
                                  -.400
C FILENAME= H910A050.E 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=50 mm
  LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894
С
 8 : No. of data points
                                  w'^3
                                          u'^2v'
                                                            v'^2w'
                                                                           w'^2u'
Су
              u'^3
                         v'^3
                                                   v'^2u'
                                                                    w'^2v'
                                                                                     11 1 ^ 2 w 1
        x
                                          .006
                                                           -.003
                         .035
                                  .004
                                                   -.019
                                                                    .003 -.001
 26.00 50.01
                -.038
                         .172
                                                           -.016
                                                                      .022 -.019
                                            .034
 24.00 50.01
                -.055
                                  -.010
                                                    -.032
                                                                                      -.006
                .072
                                                     .207
                                                              .001
                                                                               .004
 22.00 50.01
                          .599
                                  .003
                                            .122
                                                                      .185
                                                                                     -.015
                                  -.526
                                                             -.303 1.840
                                                    4.751
                                                                                     -.700
                                           4.071
                                                                              2.168
 20.00 50.01
                8.746
                         5.805
             17.568
                      16.351
                                  -.048
                                         10.518
                                                  11.843
                                                             .554 3.860
                                                                            4.303
                                                                                     -.198
 18.00 50.01
                                          3.544
                                                            -.628 -1.246
-.929 -2.811
                       12.139
                                                   7.002
                                                                              .779
                                                                                     -.129
               4.037
                                 -1.447
 16.00 50.01
                               .187
.264
                        2.515
 13.99 50.01
              -8.605
                                          -5.100
                                                   -1.718
                                                                             -3.228
                                                                                     -.273
             -12.562
                                        -5.902 -3.816 -.499 -1.700 -1.680
 12.00 50.01
                                                                                      .547
                        -1.492
C FILENAME= H910A075.E 2
```

83

```
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=75 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
  D090894
   9 : No. of data points
Су
                u'^3
                          v'^3
                                  w'^3
         х
                                            u'^2v'
                                                     v'^2u'
                                                              v'^2w'
                                                                     w'^2v'
                                                                               w'^2u'
                                                                                       u'^2w'
 26.00 75.00
                 .766
                          1.588
                                   .006
                                           .486
                                                     .869
                                                              -.001
                                                                       .346
                                                                                .133
                                                                                        -.018
 24.00
       75.00
                 8.891
                          9.001
                                   -.606
                                            4.665
                                                     6.125
                                                               -.343
                                                                        2.576
                                                                              2.570
                                                                                        -.646
 22.00 75.00
               15.231
                         17.363
                                  -1.395
                                            10.832
                                                     12.361
                                                              -.073
                                                                        4.178
                                                                               4.453
                                                                                        -.547
 20.00 75.00
              12.969
                         22.315
                                   .346
                                            9.432
                                                     13.428
                                                                .089
                                                                       2.714
                                                                               4.363
                                                                                        -.201
 18.00 75.00
15.99 75.00
                4.128
                         13.266
                                    .366
                                            2.681
                                                     5.284
                                                              -1.236
                                                                        .571
                                                                                1.727
                                                                                       -1.210
                -6.099
                          7.288
                                   -.541
                                           -4.063
                                                     -.391
                                                              -1.360 -2.816
                                                                               -1.535
                                                                                        .119
 13.98 75.00
               -9.314
                                                                     -1.356
                                                     -.948
                                                                               .189
                          2.488
                                   .334
                                           -3.569
                                                              -1.103
                                                                                        -.637
 11.99 75.00 -12.138
                          .520
                                   -.797
                                            -1.478
                                                                       .134
                                                      -.639
                                                                                        -.740
                                                              -.687
                                                                                 .118
 10.01 75.00
                 4.981
                          1.422
                                   .175 3.207
                                                                      2.003
                                                     3.138
                                                               .708
                                                                                3.620
                                                                                        2,266
C FILENAME= H910A150.E 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=150 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894
C 9 : No. of data points
              u'^3
                         v'^3
                                   w'^3
        x
                                           u'^2v'
                                                    v'^2u'
                                                             v'^2w'
                                                                      w'^2v'
                                                                               w'^2u'
                                                                                       u'^2w'
 26.00 150.00
                - 458
                          4.253
                                   -.726
                                                                              1.650
                                           1.107
                                                     1.776
                                                                       .822
                                                              -.442
                                                                                        .253
 24.00 150.00
                       3.596
               -1.108
                                            .832
                                    .172
                                                      2.012
                                                               -.551
                                                                         .396
                                                                               1.431
                                                                                         . 485
                        2.622
 21.99 150.00
               2.204
                                -1.614
                                             .854
                                                                              1.604
                                                     1.769
                                                               -.098
                                                                       1.019
                                                                                        .087
 20.00 150.00
                 .129
                         3.091
                                  -1.586
                                             .640
                                                     1.490
                                                               -.049
                                                                        .777
                                                                               1.228
                                                                                         .127
                        2.480
 18.00 150.00
               7.790
                                    .281
                                            2.444
                                                      2.951
                                                               -.473
                                                                       1.252
                                                                               2.047
                                                                                       -1.329
 15.99 150.00
               14.632
                        2.150
                                    .908
                                           2.542
                                                      3.647
                                                               .672
                                                                       1.893
                                                                               4.241
                                                                                       -.667
 13.99 150.00
               54.371
                         3.342
                                   4.012
                                           6.618
                                                     7.155
                                                               1.226
                                                                      2.839
                                                                               7.973
                                                                                       -1.497
 11.99 150.00
               433.947
                        10.692
                                  12.204
                                                               3.403
                                           58.756
                                                     45.915
                                                                     19.211
                                                                              80.675
                                                                                       -3.562
                        98.716 -28.174 370.951 242.491
 10.00 150.00 1520.931
                                                                      87.363 313.234 -94.495
                                                               .252
C FILENAME= H910A225.E_2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; x=225 mm
  LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894
   8 : No. of data points
                                 w'^3
              u'^3
                        v'^3
        x
                                           u'^2v'
                                                     v'^2u'
                                                              v'^2w'
                                                                      w'^2v'
                                                                              w'^2u'
                                                                                       u'^2w'
 24.00 224.99
               8.529
                         1.837
                                  -.212
                                                              .350
                                           2.502
                                                     1.966
                                                                       1.775
                                                                              2.828
                                                                                       .326
 22.00 224.99
               13.352
                        2.091
                                  -.238
                                            2.181
                                                     2.831
                                                                .383
                                                                       1.891
                                                                                3.417
                                                                                       -1.306
 20.00 224.99
               19.218
                        2.573
                                   .740
                                           1.051
                                                     3.681
                                                               .949
                                                                       2.874
                                                                               6.201
                                                                                       -.751
 18.00 224.99
               47.113
                         2.082
                                   -.925
                                            3.636
                                                              1.129
                                                     8.712
                                                                      1.895
                                                                             10.460
                                                                                      -1.952
 16.00 224.99
              226.099
                                 -9.319
                         7.689
                                           28.078
                                                     26.281
                                                                     6.478 37.702 -9.970
37.748 131.841 -16.770
                                                               1.021
 13.98 224.99
              610.585
                       58.387
                                -13.838 171.353
                                                  128.819
                                                              2.835
                                -23.204 249.748 180.213
-27.368 155.002 150.415
11.99 224.99
              886.338
                        92.028
                                                             -3.171 37.467 145.100 -72.778
10.00 224.99 395.767 113.335
                                                              .681
                                                                     47.844 134.532 -62.446
C FILENEME= H910AAX.J 2
C
C H2 FLAME; d=9.45, delta=1.2 mm; theta=0 deg.; Uj=100, Ua=20, Ue=4 m/s; y=0 mm
  LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
  D090894
C 22 : No. of data points
                         v'^3
              u'^3
        х
                                   w'^3
                                           u'^2v'
                                                   v'^2u'
                                                             v'^2w'
                                                                     w'^2v'
                                                                              w'^2u'
                                                                                       u'^2w'
                                           -7.544
                                                  -55.685
  .00
       1.50
              -87.970
                         -5.887
                                  -3.569
                                                             -1.071
                                                                       .065 -4.527
                                                                                       .112
  .00 9.99
             -89.744
                        1.101
                                   5.366
                                           -2.582
                                                   -61.014
                                                              4.336
                                                                     -3.549 -12.483
                                                                                       -.591
  .00 20.00 -91.203
                                                  -69.367
                        -5.843
                                 13.955
                                           -2.911
                                                              3.147
                                                                       2.806 -15.479
                                                                                       8.344
  .00 30.00 -160.425
                        -9.364
                                  2.053
                                           14.437 -120.660
                                                             8.024
                                                                     -4.632 -20.315 15.304
  .00 40.01 -450.552
                                          -17.819 -268.002
                       -24.895
                                 23.117
                                                              2.159
                                                                     -5.184 -35.735
                                                                                     31.361
  .00 50.01 -1029.567
                                         10.017 -591.720
                                82.893
                       -48.922
                                                             29.863
                                                                     22.887 -123.032
                                                                                      47.646
  .00 60.01 -1502.238
                      75.065
                                50.352
                                        23.718 -737.912
                                                              90.181 ~11.550 ~236.167 243.795
       70.00 -1081.373
  .00
                        66.723 -46.689
                                         51.971 -650.900
                                                            38.663 -11.523 -137.459 136.247
  .00 80.00 -721.883
                                          85.661 -377.494
                                                            9.926 -24.513 -136.079 135.917
                       -64.057
                                 5.633
  .00 90.00 -354.860
                       24.212 -28.932
                                           4.310 -283.321
                                                              6.094 -14.421 -142.766 126.007
  .00 100.00 -156.685
                                                                     -9.518 -149.521
                       -29.255 38.505 -37.933 -183.546
                                                             9.104
                                                                                       6.850
  .00 110.00 -80.893
                       10.745
                                -41.396
                                 -41.396 -11.854 -171.965
-1.134 -24.621 -97.892
                                                             6.568 -40.658 -100.645
                                                                                       45,520
                         8.896
  .00 120.00 -113.858
                                                             7.825 -25.003 -82.638
29.162 -32.711 -84.635
                                                                                     16.397
  .00 130.00 -68.767
                       15.706 -9.503 -17.950
                                                  -91.901
                                                                                       16.813
  .00 140.01
              -26.552
                        -7.046
                                 27.341
                                         -27.531
                                                   -49.845
                                                             -3.789
                                                                     9.714 -81.442
                                        -27.52
-21.696
                                                                                      32,559
  .00 150.00 -54.684
                         .654
                                 -6.674
                                                  -40.904
                                                             -9.455
                                                                     -6.697 -68.489
                                                                                       8.071
```

```
10.201
                    -35.158
-46.869
                                                               2.255
                                                                                          5.243
                                                                                                     2.629 -32.249
                                                                           -5.947
                                                 -1.157
     .00 170.00
                                    -8.660
                                     6.847
                                                  5.065
                                                              -16.861
                                                                           -28.017
                                                                                         -9.884
                                                                                                      -4.793 -43.937
    .00 180.00
                    -11.563
                                     7.424
                                                -14.184
                                                               13.673
                                                                           -20.364
                                                                                          1.566
                                                                                                       4.696 -44.147
                     -33.267
     .00 190.01
                     -12.499
                                      -.346
                                                 4.332
                                                                3.657
                                                                            -9.893
                                                                                          -8.210
                                                                                                       4.344 ~37.920
     .00 200.00
                    -25.958
                                    -5.128
                                                  25,229
                                                               -1.711
                                                                              .133
                                                                                          -3.685
                                                                                                      -9.656 -25.486 14.612
     .00 225.01
C FILENAME= H904A001.J 1
С
C H2 FLAME; d=9.45, d=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=1.5 mm
   LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
C 12 : No. of data points
                                           W SIG(u') SIG(v') SIG(w') u'v'
2.012 11.492 5.335 7.141 19.370
         . x
                       17
                                                                                                  v'w'
                                                                                                -.559 -1.173
   4.70
          1.50 40.383
                                4.218
          1.50 53.430 2.067
                                           1.990 16.069
                                                                           6.758
                                                                                                -.543 -6.864
                                                               8.412
                                                                                    37.920
   4.51
           1.50 72.362 2.113
1.50 91.288 1.494
                                                                                    44.752 -1.080 -7.813
46.124 -1.664 -4.921
                                                                           6.806
   4.30
                                           1.109 18.736 10.552
                                           .537 16.024 8.913
                                                                           6.972
   4.00
                                                              7.627
           1.50 103.895
                                            .374 11.732
                                                                                    39.229
                                 .678
                                                                                                 -.819 -3.870
                                                                           7.162
   3.49
                                                                                    31.270
                                                                                                  .134 -3.573
                                 .695
                                           .696 10.207 6.897
                                                                         7.133
   3.01
           1.50 110.943
                                                    9.052 6.596 6.500
8.395 5.944 6.103
                                                                                    25.089
19.743
                                            .445
                                 .426
                                                                                                   .541 -4.699
           1.50 116.721
   2.49
                                                                                                  1.393 -1.646
   2.00
            1.50 120.962
                                 .232
                                            .247
                                 .432
                                                    7.477 5.733
                                                                                                  .146 -1.937
           1.50 124.389
                                            .137
                                                                           5.625
                                                                                    14.381
   1.50
                                                     6.910 5.362 5.194
6.353 4.978 4.863
                                            .097
                                 .164
                                                                                                  -.143 -1.624
    .99
           1.50 127.509
                                                                                      11.236
                                                                                                   .717 -2.212
    .51
           1.50 129.352
                                 .032
                                            .012
                                                                                      6.173
                                                    6.243 4.936 4.570
                                 .001 -.001
                                                                                                   .418 -1.805
           1.50 130.160
                                                                                       1.985
    . 01
C FILENAME= H904A010.J 1
C H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=10 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
   D090894
C 10 : No. of data points
Су
                                                     SIG(u') SIG(v') SIG(w') u'v'
                                                                                                  v'w'
                                                                                                             w'u'
                      Ü
                                  V
                                            W
           x
  5.50 10.01 51.940 11.972
4.99 10.01 60.036 12.064
                                          5.242 15.243 12.375 16.260 119.284 -3.818 -6.450
4.903 16.862 12.665 16.359 126.302 -1.777 -8.456

    4.51
    10.01
    68.664
    9.709
    4.033
    18.411
    13.372
    15.965
    123.777
    -2.310
    -21.042

    3.99
    10.01
    82.532
    6.545
    3.314
    19.378
    13.254
    14.994
    105.242
    5.736
    -22.463

    3.42
    10.01
    96.032
    1.742
    2.301
    17.259
    12.292
    12.861
    76.342
    -3.266
    -20.280

                                           1.274 14.328 10.257 10.134
  2.71 10.01 107.880
                                                                                    59.417 -2.495 -8.435
                              -.619
                                                                                    28.489 -1.107 -4.697
                                                               8.013 7.461
6.520 6.111
                                           .758 10.804
                               - .811
  2.01
           9.99 116.029
                               -.609
  1.29
            9.99 121.748
                                            .380
                                                     8.723
                                                                                     16.943
                                                                                                -.050 -2.943
            9.99 125.466
                              -.901
                                           .206
                                                    7.664
                                                               5.625 5.228
                                                                                     8.962
                                                                                                  .138 -2.709
    .61
                                            .325
                                                                                       3.798
    .00
           9.99 127.080 -1.035
                                                     6.929 5.354 4.952
                                                                                                 - 528 -2.026
C FILENAME= H904A025.J 1
C H2 FLAME; d=9.45, d=10.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=25 mm
   LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
C 13 : No. of data points
                                             W
                                                     SIG(u') SIG(v') SIG(w') u'v'
                                                                                                   v'w'
С У
                      U
                                  V
            ×
                               4.394
                                           6.989 12.674 11.048 12.435 16.416
                                                                                                  .126 -2.087
  7.99 25.00 43.437
  7.00 25.00 46.055 7.038 6.532 12.729 11.098 14.022 53.677 -.861 -2.186 6.01 25.00 50.729 8.306 6.178 14.435 11.632 15.556 90.290 -8.833 -14.738 5.49 25.00 54.794 8.912 5.362 15.802 11.887 16.413 104.354 1.050 -9.924
  5.00 25.00 57.864 8.586 5.203 16.523 12.662 16.803 113.009 2.419 -5.296
4.50 25.00 62.663 8.003 4.757 17.202 12.749 17.162 114.261 -.207 -9.127
4.01 25.00 67.947 7.432 4.325 18.020 13.320 16.639 113.540 -7.323 -19.253

    3.41
    25.00
    77.940
    6.410
    3.788
    19.408
    13.562
    16.134
    102.907
    -2.649
    -21.557

    2.70
    25.00
    89.439
    4.492
    3.062
    19.451
    13.196
    15.276
    92.649
    3.944
    -24.651

    2.01
    25.00
    100.476
    2.076
    2.123
    18.260
    12.089
    13.661
    77.892
    3.489
    -26.090

    1.29
    25.00
    109.338
    .221
    1.109
    15.989
    11.399
    11.336
    59.757
    1.557
    -11.454

                                          .897 12.941 10.176 9.634 42.626 2.184 -10.756
.467 11.173 8.947 8.543 18.756 2.927 -11.596
         25.00 116.105
                               -.523
    .00 25.00 119.865 -1.172
C FILENAME= H904A050.J 1
C H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=50 mm C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
```

-8.571

8.735

.00 160.01

-18.388

-9.474 -13.093 -55.635

30.547

7.874

19.545

21.872

12.712

```
C D090894
C 11 : No. of data points
                                  W
         x U
                        V
                                        SIG(u') SIG(v') SIG(w') u'v'
                                                                           v'w'

    4.630
    5.918
    12.419
    10.005
    11.640
    12.621

    4.432
    5.236
    12.440
    10.879
    12.217
    14.501

  8.81 49.99 40.846
                                                                          1.727 -3.374
  8.20 49.99 42.216
                                                                          2.674 -4.591
  7.01 49.99 45.940
                                                                  61.247 -1.226 -2.091
                       6.814
                                4.914 12.943
                                                9.767 13.069
                                3.173 13.872 10.668 13.909
3.287 14.459 11.236 15.013
2.396 16.574 12.229 15.192
  5.99 49.99 49.358
                        6.320
                                                                  65.856
                                                                           .392 -1.821
  5.00 49.99 54.590
                        6.836
                                                                  85.015
                                                                           5.206
                                                                                  4.824
  3.99 49.99 61.018
                        6.875
                                                                 90.822
                                                                          1.749 -1.807
                                1.606 17.784 12.849 15.459
1.026 18.667 13.634 15.450
.884 19.050 13.570 14.996
  2.73 49.99 69.151
                        5.840
                                                                 87.294
                                                                          1.816 -5.681
  2.01 49.99 73.364
                         4.661
                                                                 88.929
                                                                          5.917 -9.422
  1.29 49.99 80.808
                        3.731
                                                                 75.479
                                                                          2.706 -16.564
   .60 49.99 83.540
                        2.351
                                 .430 18.934 14.036 14.325
                                                                 53.765
                                                                          6.846 -19.777
    .00 49.99 86.729
                        1.424
                                  .301 19.127 13.992 14.236
                                                                 46.533 2.496 -24.027
C FILENAME= H904A075.J 1
C H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=75 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
  11 : No. of data points
                 U
         x
                                  W
                                         SIG(u') SIG(v') SIG(w') u'v'
                                                                           v'w'
                                                                                    w'u'
  9.50 75.00 36.965
                        4.423
                               4.961 10.112
                                                7.464 9.049 23.819
                                                                          -.412
                                                                                   -.363
  8.20 75.00 40.955
                                                7.553
                       4.893 3.955 10.371
                                                         9.990
                                                                 34.462
                                                                          -.774
                                                                                   .178
                       3.861
  7.00 75.00 42.799
6.01 75.00 46.762
                               2.875 10.275
                                                8.053 10.435
                                                                 26.292 -2.208
                                                                                   -.875
                               2.454 11.278
1.624 11.439
                                                8.431 10.751
8.648 11.179
                        4.759
                                                                 39.688 1.883
                                                                                   3.204
  4.99 75.00 49.659
                       4.881
                                                                 40.661
                                                                           -.894
                                                                                   2.392
  4.01 75.00 52.499
2.72 75.00 54.486
                       4.602
                              1.204 12.183
                                                9.150 11.603
                                                                 44.169 -2.928
                                                                                  2.732
                                .459 12.405
.582 12.483
                                                9.399 11.737
9.676 11.865
                        3.303
                                                                 40.341 -1.227
  2.01 75.00 57.766
                        3.418
                                                                 34.556
                                                                         2.092 -2.221
  1.29 75.00 59.273
                        2.550
                                 .241 12.692
                                                9.808 11.821
                                                                 27.399
                                                                           .093
                                                                                  -.316
                               .233 13.169 10.073 11.433
-.112 12.640 10.316 11.666
        75.00
              61.049
                        2.161
                                                                 23.326 -1.222 -5.202
   .00 75.00 62.194
                        1.626
                                                                18.046 3.303 -1.802
C FILENAME= H904A150.J 1
C H2 FLAME; d=9.45, d=10.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=150 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
  D090894
  9 : No. of data points
        x
                 Ū
                                         SIG(u') SIG(v') SIG(w') u'v'
                         V
                                  W
                                                                           v'w'
                                                                                   w'u'
 13.99 150.00 29.324
                        3.167
                                3.126
                                       5.863 4.028 5.296
                                                                  9.852
                                                                           .043
                                                                                   -.628
 12.00 150.00 30.726
                                                4.066 5.115
4.165 5.323
                        3.039
                                2.525
                                         5.914
                                                                  9.253
                                                                           .898
                                                                                   .083
 10.01 150.00 31.997
                        2.817
                               1.723
                                                4.165
                                         5.998
                                                         5.323
                                                                  8.313
                                                                           -.178
                                                                                    .703
  7.99 150.00 33.687
                        2.473
                               1.264
                                         5.847
                                                4.338
                                                       5.342
                                                                  7.287
                                                                           .006
                                                                                    . 979
  5.99 150.00 34.913
                        2.160
                                 .800
                                         5.902
                                                4.252
                                                         5.191
                                                                  5.046
                                                                           .619
                                                                                   2.336
  3.98 150.00 37.109
                        2.124
                                 .467
                                         5.968
                                                 4.408
                                                         5.431
                                                                  4.635
                                                                           .270
                                                                                   2.718
  2.01 150.00 37.181
                                .182
                        1.363
                                         5.939
                                                4.510
                                                         5.257
                                                                  2.884
                                                                           .694
                                                                                   2.206
  1.00 150.00 37.597
                        1.138
                                -.077
                                         6.016
                                                4.510
                                                         5.215
                                                                  2.852
                                                                           .174
                                                                                   2,062
   .01 150.00 37.905
                               -.076
                         .799
                                         5.992
                                                 4.543
                                                         5.389
                                                                   .912
                                                                           .527
                                                                                   1.548
C FILENAME= H904A225.J 1
C H2 FLAME; d=9.45, d=10.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=225 mm
  LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
C 10 : No. of data points
                17
                        ٧
                                 W
                                        SIG(u') SIG(v') SIG(w') u'v'
                                                                           v'w'
                                                                                   w'u'
                               1.964
1.970
 18.00 224.99 25.810
                        2.400
                                        4.048
                                               2.853 3.703
                                                                  3.770
                                                                           .436
                                                                                   .428
 16.00 224.99 26.839
                        2.339
                                         4.079
                                                 2.876
                                                        4.090
                                                                  3.933
                                                                           .144
                                                                                    .443
 13.99 224.99 27.683
                       2.261
                               1.381
                                         4.145
                                                 3.037
                                                         3.784
                                                                  3.647
                                                                           .318
                                                                                   .543
 12.00 224.99 27.963
                        1.988
                               1.140
                                        3.996
                                               2.979
                                                       3.681
                                                                  3.158
                                                                           .421
                                                                                   . 440
                                                       3.746
 10.01 224.99 28.748
                        1.825
                                .913
                                        4.081
                                                 3.001
                                                                  2.734
                                                                           .246
                                                                                    .848
 7.99 224.99 29.152
                       1.626
                                 .548
                                        4.085
                                                 3.119
                                                         3.591
                                                                  2.175
                                                                          -.323
                                                                                  1.169
 5.99 224.99 29.857
                        1.259
                                 .589
                                                        3.527
                                       4.197
                                                 3.056
                                                                         -.079
                                                                  1.520
                                                                                   .846
  3.98 224.99 29.796
                                 .351
                        1.141
                                        4.105
                                                3.085
                                                        3.515
                                                                  1.394
                                                                          .098
                                                                                   .946
  2.00 224.99 29.800
                        .888
                                 .052
                                        3.998
                                                3.070
                                                        3.618
                                                                  .202
                                                                          -.168
                                                                                   .551
                                                       3.590
   .00 224.99 29.747
                                 .053 4.016 3.040
                         .501
                                                                  -.095
                                                                         -.005
                                                                                  1.157
C FILENAME= H904A001.A 1
```

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C H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=1.5 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
C 10 : No. of data points
                                                                                                                    W 1 11 1
                                                        SIG(u') SIG(v') SIG(w')
                                                                                            u'v'
                                                                                                        v'w'
                       IJ
                                    V
                                                W
Су
            x
                                  4.314 16.709
                                                                   3.343
                                                                                            2.597
                                                                                                       3.432
                                                                                                                   .093
            1.50 23.082
                                                        2.921
                                                                               4.271
 13.49
                                                                                                                  -.314
                                                       2.315
                                                                    2.789
                                                                               2.714
                                                                                            .778
                                                                                                       1.769
 13.01
            1.50 23.360
                                4.397 18.023
                                4.465 18.403
                                                       2.093
                                                                   2.641
                                                                               2.062
                                                                                             .167
                                                                                                       1.068
                                                                                                                  -.135
            1.50 23.590
 12.51
                                4.534 18.584
4.684 18.259
                                                                                                                  -.255
                                                        2.082
                                                                   2.561
                                                                               1.871
                                                                                            -.177
                                                                                                        .721
            1.50 23.866
 12.01
                                                       2.126
                                                                   2.471
                                                                               1.882
                                                                                            -.203
                                                                                                       -.120
 11.19
            1.50 23.969
                                                                               2.193
                                                                                           -.146 -1.272
                                                                                                                  -.606
                                5.006 17.012
                                                        2.257
                                                                   2.359
 10.40
            1.50
                   24.486
                                5.621 15.212
4.686 12.362
                                                        2.305
                                                                   2.161
                                                                               2.206
                                                                                           -.605 -1.233
                                                                                                                    .236
                    24.450
  9.60
            1.50
                                                                                                        .490
                                                                                          -1.259
                                                                                                                   2.533
                                                                               2.370
                     20.948
                                                        3.733
                                                                   2.259
  8.20
            1.50
                                                                                                         .186
                                                        4.206
                                                                   2.623
                                                                               3.262
                                                                                           -2.198
                                                                                                                  1.840
            1.50 14.143
                                 2.309
                                            9.054
  6.99
                                -.018
                                             6.459
                                                        3.848
                                                                   2.353
                                                                               3.437
                                                                                             .000
                                                                                                        -.006
                                                                                                                   -.986
            1.50
                     8.236
   6.01
C FILENAME= H904A010.A_1
C H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=10 mm
   LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
    9 : No. of data points
                                                                                                         v'w'
                                                                                                                    W 111
                                                        SIG(u') SIG(v') SIG(w')
                                                                                            u'v'
                       Ū
                                               W
Су
             х
                                                                                                       7.012
                                                                                                                    .491
                                            6.742
                                                       4.818 5.519
                                                                              5.357
                                                                                          10.157
 18.00
            9.99
                   11.869
                                  6.507
                                                      4.651
                                                                                           10.107
                                                                                                       4.748
                                                                                                                   2.156
           9.99 20.607
                                7.249 11.457
                                                                    4.771
                                                                               4.714
 16.00
                                 6.700 14.925
                                                        2.490
                                                                   2.885
                                                                               2.583
                                                                                            .655
                                                                                                        .467
           9.99 24.260
 13.99
                                 6.623 14.300
                                                                                                                   1.749
                                                                   2.377
                                                                               2,689
                                                                                            -.810
                                                                                                       -.874
 13.02
          10.00 23.825
                                                        2.537
                                                        2.935
                                                                   2.160
                                                                               2.923
                                                                                            -.532 -1.038
                                                                                                                  2.698
 11.98 10.00 21.971
                                  6.521 11.812
                                                        3.318
                                                                    2.087
                                                                               2.554
                                                                                              .266
                                                                                                       -.276
                                                                                                                   2.311
 11.01 10.00 20.069
                                 5.922
                                             9.122
                                                                                                                   1.768
                                  4.729
                                             7.363
                                                        3.549
                                                                    2.281
                                                                               2.364
                                                                                            1.207
                                                                                                       -.015
 10.00
           10.00
                    17.664
                                                                                                       -.235
                                                                                                                   .955
                                             5.776
                                                        3.750
                                                                   2.525
                                                                               2.511
                                                                                            2.823
  9.01
          10.00 14.719
                                 2.832
  8.01 10.00 11.488
                                  .219
                                             4.845
                                                        4.600
                                                                   3.580
                                                                               2.711
                                                                                            5.995
                                                                                                       -.287
                                                                                                                   -.229
C FILENAME= H904A025.A 1
C H2 FLAME; d=9.45, d=162, d=162
  LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
C 15 : No. of data points
                                                        SIG(u') SIG(v') SIG(w')
                                                                                            u'v'
                                                                                                        v'w'
                                                                                                                    w'u'
                        U
                                                W
Су
             x
 24.00 25.00 10.174
                                                                   5.512
                                                                                            8.266
                                                                                                        4.909
                                             3.635
                                                        4.529
                                                                              4.682
                                  5.371
                                                                                           12.086
                                                                                                       5.151
                                                                                                                  1.589
                                  5.648
                                             4.555
                                                        4.925
                                                                    5.647
                                                                               4.758
 23.00 25.00 12.264
 22.00 25.00 14.730
21.00 25.00 17.235
                                                                                           12.644
                                                                                                                  3.006
                                 6.184
                                             5.621
                                                        5.284
                                                                    5.499
                                                                               4.805
                                                                                                        5.110
                                                                                           12.373
                                                                                                        5.775
                                                                                                                  2.605
                                                        5.049
                                                                    5.377
                                                                               4.856
                                  6.310
                                             6.540
                                5.782
                                             7.264
                                                        5.136
                                                                   5.327
                                                                               4.647
                                                                                           12.743
                                                                                                       5.875
                                                                                                                  3 163
 20.00 25.00 18.966
                                5.871
5.398
 19.00 25.00 21.654
                                             8.309
                                                        4.575
                                                                   4.991
                                                                               4.172
                                                                                           10.243
                                                                                                        4.368
                                                                                                       3.590
                                                                                                                  2.558
                    22.903
                                             8.775
                                                        3.951
                                                                    4.733
                                                                               3.864
                                                                                            7.160
 18.01
           25.00
 16.98 25.00 23.783
                                4.820
                                             9.190
                                                        3.478
                                                                    4.305
                                                                               3.338
                                                                                            3.950
                                                                                                       2.338
                                                                                                                  1.897
                                                                               2.999
                                                                                            1.097
                                                                                                       1.204
                                                                                                                   1.981
                                4.032
                                                        3.232
                                                                    3,786
 16.01 25.00 23.529
                                             9.194
                                 2.826
                                             8.957
                                                        3.385
                                                                    3.390
                                                                               2.885
                                                                                             .417
                                                                                                        .462
                                                                                                                   2.437
 14.99
           25.00
                    22.860
                                1.676
                                             8.273
                                                        3.884
                                                                    3.077
                                                                               2.870
                                                                                             .030
                                                                                                        .410
                                                                                                                   3.646
                    20.294
 14.01
           25.00
                                                                                                                   3.098
                                  .058
                                                                                            -.011
           25.00
                    18.544
                                             7.933
                                                        3.920
                                                                   2.870
                                                                               2.867
                                                                                                       -.333
 13.01
                                                        4.515
                                                                    3.112
                                                                               3.039
                                                                                            1.290
                                                                                                       -.537
                                                                                                                   2.723
           25.00
                     14.892
                                -1.834
                                             7.418
 12.00
                                                                               3.635
                                                                                            -.410
                                                                                                        -.493
                                                                                                                  1.481
           25.00 10.664 -3.246
                                             7.182
                                                        4.964
                                                                    4.683
 11.01
 10.99 25.00 10.356 -3.619
                                             6.979
                                                        5.020
                                                                    4.034
                                                                               3.449
                                                                                            2.058
                                                                                                       -.503
                                                                                                                    . 473
C FILENAME= H904A050.A 1
С
C H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=50 mm
  LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C
   D090894
C 14 : No. of data points
                                                                                                                    w'u'
                                               W
                                                        SIG(u') SIG(v') SIG(w')
                                                                                             u'v'
                                                                                                         v'w'
                                   V
                       U
             х
                                                                                            5.925
                                                                                                       3.532
                                                                                                                  1.433
                                             4.406
                                                                    4.189
                                                                               3.955
 26.00 50.01 15.219
                                  4.137
                                                        4.004
  24.00 50.01 17.010
                                                                               3.555
                                                                                            4.716
                                                                                                       2.599
                                                                                                                  1.713
                                 3.408
                                            5.028
                                                        3.941
                                                                    4.096
                                                                    4.059
                                                                                            3.758
                                                                                                        2.871
                                                                                                                  1.528
                                 2.477
                                             5.092
                                                        3.833
                                                                               3,405
  22.00 50.01 17.238
 20.00 50.01 18.078
18.00 50.01 17.421
                                 1.514
                                             5.565
                                                        3.431
                                                                    3.717
                                                                                3.215
                                                                                            2.334
                                                                                                        2.513
                                                                                                                   1.219
                                  .313
                                                        3.369
                                                                    3.507
                                                                               3.170
                                                                                            1.294
                                                                                                        2.604
                                             5.946
                                                                                             .658
                                                                                                        2.031
                                                                                                                    .468
  15.99
           50.01 16.176
                                 -.975
                                             6.054
                                                        3.230
                                                                    3.104
                                                                               3.058
 15.01 50.01 15.368 -1.446
14.01 50.01 14.479 -1.859
                                             6.139
                                                        3.263
                                                                    3.030
                                                                                2.928
                                                                                            -.394
                                                                                                        1.965
                                                                                                                    .380
                                                                                            -.570
                                                                                                        2.433
                                                                                                                    .331
  14.01
                                             5.912
                                                        3.238
                                                                    2.928
                                                                               2.996
```

```
13.00 50.01 13.916 -2.282 5.914
                                       3.209
                                              2.858
                                                       3.075
                                                               -.551
                                                                       2.452
                                                                                . 653
                              5.828
 12.00 50.01 13.259 -2.571
                                       3.311
                                              2.865
                                                       3,115
                                                                       2.453
                                                               -.812
                                                                                .336
 11.01
        50.01
              13.101
                      -2.861
                               5.711
                                       3.222
                                               2.925
                                                       3.296
                                                               -.274
                                                                       2.681
                                                                                . 606
        50.01 12.806
  9.99
                      -3.023
                               5.507
                                       3.454
                                               3.063
                                                       3.784
                                                               -.033
                                                                       2.901
                                                                                .793
  9.00 50.01 13.839 -3.050
                               5.712
                                       4.390
                                               4.386
                                                       5.245
                                                               3.731
                                                                       3.462
                                                                               2.636
  8.00 50.01 19.203 -1.673
                               6.459 10.056
                                               8.184
                                                       8.947
                                                               40.248 12.358
                                                                               7.157
C FILENAME= H904A075.A 1
   H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=75 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
   18 : No. of data points
         х
                 U
                         V
                                 W
                                       SIG(u') SIG(v') SIG(w')
                                                               11 ' 37 '
                                                                                w 111 1
                                                                        v'w'
 26.00 75.00 15.188
                        2.058
                               3.542
                                       3.012
                                             3.078
                                                      2.694
                                                               1.706
                                                                       1.760
                                                                                .696
 24.00 75.00 15.540
22.00 75.00 15.453
                      1.576
                              3.886
                                       2.824
                                               2.957
                                                      2.630
                                                               1.041
                                                                      1.414
                                                                                . 582
                       1.129
                               4.230
                                       2.729
                                              2.889
                                                      2.544
                                                                .865 1.438
                                                                                .356
 21.00 75.00 15.426
                        .968
                              4.454
                                       2.657
                                               2.920
                                                      2.428
                                                                .825
                                                                       1.531
                                                                                .563
                      1.163
                                                                     1.387
 20.00 75.00 14.709
                              4.415
                                       2.692
                                              2.825 2.433
                                                                .040
                                                                                .457
 19.00 75.00 15.248
18.01 75.00 14.981
                       .598
                              4.600
                                       2.590
                                              2.749 2.420
                                                                .348 1.556
                                                                                .342
                        .442
                               4.696
                                       2.549
                                              2.678 2.320
                                                                .191 1.382
                                                                               .394
                                                                     1.494
 15.99 75.00 14.847
                        .100
                               4.910
                                       2.448
                                               2.617
                                                                .341
                                                      2.362
                                                                                .642
 13.99 75.00 14.754
                                              2.673 2.596
                      -.149
                               5.099
                                       2.606
                                                                .720
                                                                       1.773
                                                                                .700
 11.99 75.00 15.110
11.01 75.00 15.588
                      -.740
                              5.219
                                       2.684
                                              2.679 2.819
                                                                      2.192
                                                                .794
                                                                                .946
              15.588 -1.046
                               5.193
                                       3.134
                                              2.846 3.231
                                                               1.567
                                                                      2.392
                                                                               1.422
  9.99 75.00 16.704 -1.226
                               5.203
                                       4.442
                                              3.531
                                                      4.411
                                                               3.587
                                                                       3.566
                                                                              2.417
  9.00 75.00 19.680 -1.141
                               5.300
                                       7.261
                                               4.891
                                                      5.731
                                                              13.437
                                                                       5.938
                                                                               3.989
  8.00 75.00 23.987
                       -.638
                                              6.695
                               4.722 10.180
                                                      7.171
                                                              31.027
                                                                       5.278
                                                                              2.257
  5.99 75.00 33.640
                       -.506
                               4.008
                                      13.283
                                              9.062
                                                      9.837
                                                              53.963
                                                                      7.771
                                                                             -1.539
                               3.552 14.282
  5.01 75.00 38.962
                       -.199
                                             10.099 10.819
                                                              64.465
                                                                      12.332
                                                                              2.082
  4.00 75.00 42.967
                      -.603
                               3.062 14.997
                                             10.452 11.345
                                                              61.910 12.893 -2.989
  3.02 75.00 46.444 -1.122
                              3.046 15.090 10.936 11.528
                                                              57.528 10.960 -8.503
C FILENAME= H904A150.A_1
C
C H2 FLAME; d=9.45, d=10.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=150 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
   D090894
C 14 : No. of data points
        x
                U
                        V
                                W
                                       SIG(u') SIG(v') SIG(w')
                                                                u'v'
                                                                        v'w'
                                                                               w'u'
 26.00 149.99 13.408
                        .667
                              2.366
                                      1.843 1.706 1.646
                                                                .991
                                                                       .573
                                                                                .179
 24.00 149.99 13.800
                                                     1.700
                        .464
                               2.547
                                       1.876
                                              1.700
                                                                .803
                                                                       .602
                                                                               .222
 22.00 149.99 14.092
                              2.567
                        .304
                                       1.905
                                              1.621
                                                      1.684
                                                                .779
                                                                        .669
                                                                                .242
 20.00 149.99 14.540
                        .122
                              2.668
                                                     1.773
                                      2.056
                                              1.694
                                                                .802
                                                                        .862
                                                                                .203
 18.00 149.99 14.984
                                                     1.863
                       -.070
                              2.750
                                      2 248
                                              1.739
                                                                .817
                                                                        .766
                                                                               .272
 16.00 149.99 15.787
                      -.250
                              2.898
                                       2.855
                                              1.895
                                                     2.254
                                                               1.271
                                                                      1.053
                                                                               .804
                                                     2.807
 13.99 149.99 17.387
                       -.305
                              2.953
                                      4.072
                                              2.500
                                                               3.080
                                                                       .870
                                                                               .698
 12.00 149.99 20.031
                             3.005
                                      5.655
                      -.103
                                              3.492
                                                     3.698
                                                               8.605
                                                                      1.612
                                                                              1.361
                                                     4.341
 10.01 149.99 22.739
                        .021
                              2.605
                                       6.404
                                              4.085
                                                              10.916
                                                                      2.016
                                                                              1.349
 7.99 149.99 25.972
                        .291
                               1.911
                                      7.078
                                              4.554
                                                     4.850
                                                              12.699
                                                                       .963
                                                                             -1.042
 5.99 149.99 28.282
                       .162
                              1.276
                                      7.130
                                              4.834
                                                      5.276
                                                              12,761
                                                                        .979
                                                                               .233
  3.98 149.99
              30.074
                       -.005
                              1.083
                                      6.923
                                              5.090
                                                      5.351
                                                               9.854
                                                                       .571
                                                                               1,121
  2.01 149.99 31.963
                      -.331
                               .764
                                       6.952
                                              5.187
                                                      5.429
                                                               6.967
                                                                        .557
                                                                               .986
   .00 149.99 32.691
                      -.437
                                .549
                                       6.828
                                              5.221
                                                      5.510
                                                               4.119
                                                                        .532
                                                                              -.820
C FILENAME= H904A225.A_1
  H2 FLAME; d=9.45, d=10.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=225 mm
  LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
C 14 : No. of data points
         х
                U
                       V
                                W
                                      SIG(u') SIG(v') SIG(w')
                                                              u'v'
                                                                       v'w'
                                                                               w'11'
 26.00 224.99 13.327
                       -.001
                              1.542
                                      2.076
                                             1.437
                                                     1.736
                                                               1.007
                                                                       . 605
                                                                               .465
 24.00 224.99 13.708
                      -.081
                              1.606
                                      2.213
                                              1.438
                                                      1.797
                                                               1.053
                                                                       .614
                                                                               .472
 22.00 224.99 14.261
                      -.181
                              1.730
                                      2.430
                                              1.492
                                                     1.929
                                                               1.139
                                                                       661
                                                                               - 692
20.00 224.99 14.934
                      -.290
                              1.761
                                      2.926
                                                     2.172
                                              1.637
                                                               1.776
                                                                       .714
                                                                               .880
18.00 224.99 15.984
                      -.332
                              1.739
                                      3.497
                                              1.848
                                                      2.334
                                                               2.568
                                                                       .836
                                                                              1,208
15.99 224.99 17.101
                       -.366
                              1.702
                                      4.063
                                              2.103
                                                      2.504
                                                               3.646
                                                                       .931
                                                                              1.538
 13.99 224.99 19.012
                       -.096
                              1.779
                                      4.644
                                              2.607
                                                      2.898
                                                               5.454
                                                                      1.064
                                                                              1.708
11.99 224.99 20.059
                       -.196
                              1.484
                                      4.883
                                              2.744
                                                      3.092
                                                                       .785
                                                              5.822
                                                                              1.421
 9.99 224.99 21.887
                       .041
                             1.328
                                      4.979
                                              3.082
                                                      3.262
                                                               6.337
                                                                       - 670
                                                                              1.721
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.222
  7.99 224.99 23.482
                                .862
                                      4.920
                                             3.228
                                                       3.447
                                                               5.740
                                                                        .203
                                                                               1.641
                                                       3.554
                                                               4.804
                                                                       -.251
                                                                               1.140
                                      4.746
                                              3.304
                                .816
  5.99 224.99 24.273
                       -.080
                                                                              1.786
                                       4.666
                                              3.320
                                                       3.518
                                                               3.357
                                                                        .130
  3.98 224.99 25.257
                       -.020
                                .509
                       .063
                                .282
                                      4.656
                                               3.463
                                                       3.575
                                                               2.323
                                                                       -.042
                                                                               1.905
  2.01 224.99 25.998
                                                                              1.819
   .00 224.99 26.145
                       -.099
                                .119
                                       4.573
                                               3.400
                                                       3.556
                                                                .953
                                                                        .114
C FILENAME= H904A001.E 1
C H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=1.5 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894
C.
  8 : No. of data points
                                       SIG(u') SIG(v') SIG(w') u'v'
                                                                        v'w'
                                                                                w'u'
                        V
                                 W
                U
         х
                                                      .360
                                                               -.010
                                                                        .013
                                                                                .010
       1.50
                       -.205
                               .074
 26.00
              4.059
                                       .269
                                                .213
              3.970
 24.00
                                                       .392
                                                               -.019
                                                                        .008
                                                                                .005
        1.50
                       -.249
                                .051
                                        .297
                                                .234
                                                               -.021
                                                                                .007
                                                                        - 015
               3.908
                       -.308
                                .071
                                        .340
                                                .245
                                                       .406
 22.00
        1.50
                                                                                .009
                                .095
                                       .399
                                                               -.036
                                                                        .017
               3.758
                       -.413
                                                .293
                                                       .417
 20.00
        1.50
                                .149
                                                .436
                                                       .524
                                                               -.053
                                                                        .030
                                                                                .015
 18.00
        1.50
               3.490
                       -.541
                                        .532
                               1.059
                                                       1.943
                                                               -.200
                                                                        .266
                                                                               -.069
 16.00
               3.676
                       -.714
                                       1.240
                                              1.685
        1.50
              8.295
                        .319
                                                               8.761
                                                                       3.859
                                                                               3.092
                               6.321
                                      4.059
                                              4.649
                                                       5.642
 15.01
        1.50
                                                              14.089
                                                                               2.714
                                                                       4.667
             19.333
                        .471 11.898
                                      5.350
                                              5.227
                                                       6.102
 14.01
       1.50
C FILENAME= H904A010.E 1
С
C H2 FLAME; d=9.45, d=10.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=10 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY. C D090894
  8 : No. of data points
                                       SIG(u') SIG(v') SIG(w') u'v'
                                                                        v'w'
                                                                                w'u'
су.
               Ū
                                 W
        x
                                .050
                                               .336
                                                       .398
                                                                                .026
 26.00 10.00
               4.040
                       -.208
                                                               -.011
                                                                        .017
                                       .348
                                       .437
                                                                        .026
                                                                                .040
                      -.216
                                .046
                                                .448
                                                       .441
                                                               -.034
 24.00 10.00
              4.021
                                .055
               3.990
                                                       .605
                                                                                .080
                                                .775
                                                               -.088
                                                                        .073
 22.00 10.00
                       -.213
                                        .667
                                      1.268
                                              1.788
                                                       1.426
                                                                               -.026
 20.00 10.00
               4.478
                       -.210
                                .589
                                                               -.123
                                                                        .219
 18.00 10.00
               9.951
                       1.952
                               5.681
                                       4.565
                                               4.915
                                                       5.029
                                                              10.335
                                                                       7.185
                                                                               4.276
                                              5.585
                      3.364 10.529
3.015 12.375
2.092 14.117
                                      5.489
                                                       4.945
                                                              14.384
                                                                       7.623
                                                                               2.964
 16.00 10.00 19.425
 15.01 10.00 22.876
14.00 10.00 24.350
                                       4.847
                                              4.942
                                                       4.588
                                                               9.674
                                                                       5.174
                                                                               1.268
                                      4.002 4.213 3.869
                                                               5.877
                                                                       3.285
C FILENAME= H904A025.E 1
C H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=25 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
  D090894
  7 : No. of data points
C
                                       SIG(u') SIG(v') SIG(w') u'v'
                        V
                                                                        v'w'
                                                                                w'u'
Су
               Ū
                                 W
        x
               4.732
                       -.420
                                .506
                                       1.588
                                              2.027
                                                      1.633
                                                                .227
                                                                        .373
                                                                               -.007
 26.00 25.00
                                                               5.231
                                                                       3.248
              7.272
                                               3.748
                                                       3.375
                       .282
                               2.000
                                      3.257
 24.00 25.00
                                                       4.467
                                                                       6.021
 22.00 25.00 11.677
                      1.349
                               4.525
                                       4.903 5.069
                                                              12.122
                                                                               4.365
 20.00 25.00 16.875
                       2.115
                               6.431
                                       5.421
                                               5.543
                                                       4.672
                                                              15.795
                                                                       6.550
                                                                               4.024
                       1.351
                                              5.387
                                                       4.255
                                                              11.875
                                                                       4.705
                                                                              1.548
 18.00 25.00 20.700
                               7.661
                                      4.846
                        .118
                               8.531
                                      4.250
                                              4.956 3.660
                                                               8.395
                                                                       3.773
                                                                               1.487
 15.99 25.00 22.147
 13.99 25.00 20.203 -2.522
                               8.221
                                      4.226
                                              4.075
                                                     3.409
                                                               3,292
                                                                       2,476
                                                                               2.256
C FILENAME= H904A050.E 1
C H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=50 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894
C 11 : No. of data points
                                       SIG(u') SIG(v') SIG(w') u'v'
                                                                        v'w'
                 U
                         W
                                W
  У
 26.00 50.00 13.409
                       1.453
                               3.611
                                       4.182 4.225 3.648
                                                               8.303
                                                                       3.409
                                                                               1.870
 24.00 50.00 15.377 1.125
22.00 50.00 16.056 .535
20.00 50.00 16.525 -.325
                               4.069
                                              4.230
                                                       3.570
                                                               7.338
                                                                       3.693
                                                                               1.940
                                      4.064
                                              4.140
                               4.297
                                       4.142
                                                       3.416
                                                               6.520
                                                                       3.638
                                                                               2.230
                               4.916
                                      3.861
                                               3.873
                                                      3.259
                                                              4.543
                                                                       3.220
                                              3.691
3.495
                                                                               .704
                               5.335
                                      3.745
                                                                       3.616
 18.00 50.00 15.904 -1.162
                                                      3.147
                                                               2.174
 17.00 50.00 15.217 -1.674
16.01 50.00 14.411 -1.853
                                                       3.132
                               5.560
                                       3.656
                                                               1.757
                                                                       3.291
                                                                                .164
                                                                .426
                               5.763
                                      3.703
                                              3.271
                                                       3.043
                                                                       2.877
                                                                                .365
 14.99 50.00 13.427 -2.269
                               5.807
                                      3.814
                                              3.172
                                                       3.040
                                                               -.651
                                                                       3.038
                                                                                .274
                               6.028
                                      3.717
                                               3.179
                                                       2.967
                                                              -1.480
                                                                       2.664
                                                                                .098
 14.01 50.00 12.583 -2.186
                                              3.044
 13.00 50.00 11.996 -2.639
                               5.989
                                       3.654
                                                       2.936
                                                              -1.883
                                                                       3.034
                                                                                .274
 12.00 50.00 11.250 -2.506 5.960
                                              3.027 3.117
                                      3.681
                                                              -2.336
                                                                       3.046
                                                                                .413
```

```
C FILENAME= H904A075.E 1
   H2 FLAME; d=9.45, d=10.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=75 mm
  LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894 ·
C 15 : No. of data points
                                        SIG(u') SIG(v') SIG(w')
                  Ü
          х
                                  W
                                                                 u'v'
                                                                          ซ่พ่
                                                                                  w'u'
 26.00 75.00 14.578
                          .992
                                3.249
                                        2.988
                                                3.101
                                                        2.646
                                                                 2.550
                                                                         1.893
                                                                                   .686
 24.00
        75.00 14.496
                        1.206
                                3.508
                                        3.062
                                                3.121
                                                        2.497
                                                                  .587
                                                                         1.686
                                                                                   .368
 22.00
        75.00
               14.743
                         .630
                                3.959
                                        2.776
                                                2.987
                                                        2,489
                                                                  .748
                                                                         2.031
                                                                                 -.027
 20.00 75.00 14.731
                         .444
                                4.205
                                        2.704
                                                2.816
                                                        2.329
                                                                  .774
                                                                         1.637
                                                                                 -.069
 19.00 75.00 14.327
                        -.058
                                4.362
                                        2.757
                                                2.807
                                                        2,400
                                                                  .169
                                                                         1.792
                                                                                  .099
                         .368
 18.01
        75.00
               13.978
                                4.545
                                        2,660
                                                2.775
                                                        2.327
                                                                 -.245
                                                                         1.368
 17.00
        75.00 13.872
                        -.159
                                4.571
                                        2.653
                                                2.699
                                                        2.298
                                                                  .325
                                                                         1.678
                                                                                  .195
 16.00 75.00 13.727
                        -.225
                                4.787
                                        2.589
                                                2.649
                                                        2.302
                                                                  .080
                                                                         1.901
                                                                                  .252
 15.01 75.00 13.609
                       -.402
                                4.889
                                        2.667
                                                2.614
                                                        2.338
                                                                  .432
                                                                        2.158
                                                                                  . 413
 14.01
        75.00 13.585
                        -.393
                                4.972
                                        2.681
                                                2.574
                                                        2.388
                                                                  .301
                                                                         1.786
                                                                                  .776
 13.01 75.00 13.805
                        -.533
                                5.044
                                        2.854
                                                2.648
                                                        2.708
                                                                  .898
                                                                         2.101
                                                                                  .617
 12.00 75.00 13.998
                        -.620
                                5.185
                                        2,969
                                                2.755
                                                        2.824
                                                                  .693
                                                                         2.583
                                                                                 1.052
 11.01 75.00 14.621
                       -.912
                                5.046
                                        3.327
                                                2.924
                                                        3.249
                                                                 1.908
                                                                         3,399
                                                                                 1.397
  9.99
        75.00 15.698 -1.263
                                4.972
                                        4.275
                                                3.300
                                                        3.956
                                                                 2.714
                                                                         3.710
                                                                                 1.299
  9.01 75.00 17.812 -1.279
                                4.517
                                        6.010
                                                4.159
                                                        5.104
                                                                 6.613
                                                                         5.095
                                                                                  .284
C FILENAME= H904A150.E 1
  H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=150 mm
С
  LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
  D090894
   6 : No. of data points
         х
                 U
                          v
                                  W
                                        SIG(u') SIG(v') SIG(w')
                                                                  u'v'
                                                                          v'w'
                                                                                  w'u'
 26.00 150.00 13.238
                         .609
                                2.382
                                        2.077
                                                1.771
                                                        1.693
                                                                 1,118
                                                                          .832
                                                                                 -.047
 24.00 150.00
               13.756
                         .483
                                2.433
                                        2.041
                                                        1.602
                                                1.752
                                                                 1.073
                                                                          .669
                                                                                 -.194
 22.00 150.00 14.175
                         .369
                                2.487
                                        2.075
                                                1.755
                                                        1.733
                                                                  .971
                                                                          .933
                                                                                 -.026
 18.00 150.00 15.538
                         .146
                                2.760
                                        2.951
                                                1.967
                                                        2,248
                                                                  984
                                                                         1.159
                                                                                 -.308
 16.00 150.00
               16.465
                         .085
                                2.837
                                        3.395
                                                2.167
                                                        2.397
                                                                 2.387
                                                                         1.145
                                                                                  .078
 13.99 150.00 19.371
                        .367
                                2.666
                                        5.121
                                                3.070
                                                        3.262
                                                                 6.697
                                                                         1.356
                                                                                -1.062
C FILENAME= H904A225.E 1
C H2 FLAME; d=9.45, d=10.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=225 mm
  LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
  D090894
C 10 : No. of data points
         ×
                 ΓT
                          ۲,7
                                 W
                                        SIG(u') SIG(v') SIG(w')
                                                                u'v'
                                                                          v'w'
                                                                                  w'u'
 26.00 224.99 13.387
                        -.087
                               1.383
                                        2.180
                                                1.456
                                                       1.682
                                                                 .840
                                                                          .591
                                                                                 -.016
 24.00 224.99 14.520
                        .066
                               1.585
                                        2.946
                                                1.699
                                                        2.116
                                                                 1.916
                                                                                 .508
                                                                         1.033
 22.00 224.99 14.599
                        -.284
                               1.403
                                        3.007
                                                1.732
                                                        1.984
                                                                 1.693
                                                                          .933
                                                                                 -.023
 20.00 224.99 16.277
                        -.033
                               1.525
                                        3.714
                                                2.083
                                                        2.247
                                                                 2.582
                                                                          . 956
                                                                                 -.452
 18.00 224.99 18.222
                         .121
                               1.356
                                        4.238
                                                       2.575
                                                2.497
                                                                 3.895
                                                                         1.157
                                                                                -.373
 15.99 224.99
              19.497
                         .268
                               1.300
                                        4.312
                                                2.750
                                                        2.816
                                                                 4.691
                                                                         .602
                                                                                -1.202
 13.99 224.99
              21.110
                         .512
                               1.084
                                        4.545
                                                2.868
                                                        2.896
                                                                 4.902
                                                                          .688 -1.482
 11.99 224.99
              20.812
                         .165
                               1.120
                                        4.659
                                                2.791
                                                        2.891
                                                                 4.945
                                                                         .826
                                                                                -1.365
 10.00 224.99
              22,260
                         .085
                                .809
                                        4.558
                                                2.850
                                                        3.160
                                                                 3.909
                                                                          .409
                                                                               -1.558
  8.00 224.99 23.356
                         .271
                                 .935
                                        4.489
                                                2.983
                                                        3.055
                                                                 3.414
                                                                          .263 -1.725
C FILENAME= H904AAX.J_1
  H2 FLAME; d=9.45, d=10.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; y=0 mm
  LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
  D090894
  22 : No. of data points
         x
                 U
                        v
                                 W
  У
                                       SIG(u') SIG(v') SIG(w')
                                                                          v'w'
                                                                u'v'
        1.50 129.999
   .00
                         .001
                               -.010
                                        6.044
                                                4.963
                                                       4.655
                                                                 1.798
                                                                        1.092 -1.129
   .00 10.00 127.485
                                .297
                      -.770
                                       6.657
                                                5,202
                                                        4.844
                                                                 3.154
                                                                         .166
                                                                                -.795
   .00 20.00 124.431 -1.481
                                .603
                                       9.221
                                               7.220
                                                        6.678
                                                                 9.466
                                                                          .617 -3 795
   .00
       30.00 115.284
                      -1.012
                               1.002
                                      13.761 11.219
                                                     10.029
                                                               22.822
                                                                         6.621 -15.054
   .00 40.01 102.083
                               1.189 17.802 13.859
                        .407
                                                      12.962
                                                               31.422
                                                                        4.919 -25.531
   .00 50.00 86.809
                       1.463
                               1.513 18.629 14.467
                                                      13.805
                                                               35.162
                                                                       -1.744 -31.176
   .00
       60.01 74.397
                        .898
                                .903 16.595 12.783 13.536
                                                               28.557
                                                                        2.592 -10.466
   .00
       70.00 63.127
                         .461
                               1.156 13.970 10.985 12.166
                                                               17.959
                                                                        4.042 -10.422
```

```
.186 11.312 9.300 10.674 13.817
.313 9.788 7.888 9.562 8.006
   .00 80.00 58.433 1.044
                                                                                  -.200 -6.432
                                                                          8.006
                          .778
   .00 90.00 53.218
                                                                                  1.062 -4.962
                                            8.853 7.154
   .00 100.00 49.522
                            .874
                                                               8.349
                                                                         8.658
                                                                                   1.062
                                    -.121
                                                                       4.963
                                                                                   .175
                                                                                           -.896
                            .891
   .00 110.00 46.415
                                   -.047
                                            7.930 6.128
                                                               7.317
                                            7.222
6.859
                                                     5.658
5.204
                            .989
   .00 120.00 43.641
                                    -.094
                                                               6.657
                                                                         2.693
                                                                                   -.662
                                                                                             .920
                                                                                   -.073
                                                                                             .604
                                    .112
                                                                          3.006
   .00 130.00 41.185
                            .594
                                                               6.227
   .00 140.00 39.887
                            .542
                                            6.461
                                    -.172
                                                     4.726
                                                               5.578
                                                                       1.642
                                                                                   .067
                                                                       .310
                            .599
                                            5.926 4.545 5.292
                                                                                    .113
                                                                                             . 688
   .00 150.01 37.942
                                    -.080
   .00 160.00 36.374
.00 170.01 35.142
                                                      4.303
                                                               4.991
                                                                           .467
                                                                                   -.095
                                                                                             .768
                            .808
                                    -.101
                                            5.582
                                            5.032 3.957
                            .388
                                    .181
                                                               4.964
                                                                           .795
                                                                                   .622
                                                                                             .717
                                                                                    .198
                                                                                             .112
                            .604
   .00 180.00 33.909
                                     .130
                                            4.853 3.867
                                                               4.444
                                                                          -.514
                                                     3.571
   .00 190.01 32.864
.00 200.01 31.782
                                            4.814
4.419
                            .454
                                    -.015
                                                               4.022
                                                                         -.789
                                                                                    .157
                                                                                             .408
                            .433
                                                                         -.007
                                                                                    .282
                                                                                             .066
                                    -.054
                                                      3.468
                                                               4.086
   .00 224.99 29.833
                                            3.860 2.998
                                                                          -.387
                                                                                    .015
                                                                                            -.439
                            .438
                                    .150
                                                               3.764
C FILENAME= H904A001.J 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=1.5 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
  D090894
C 12 : No. of data points
                                                                          v'^2w' w'^2v' w'^2u' u'^2w'
11.002 14.756 47.920 10.085
                  u'^3
                                                    u'^2v'
                               v'^3
                                          w'^3
                                                               v'^2u'
          x
Су
                                        22.748
                                                  198.393 121.994
  4.70
                             -18.093
         1.50
                  918.544
        1.50 2494.387
                           168.211
                                                                           -38.829 -5.261 49.791 -158.758
                                          47.573 522.527 368.078
  4.51
         1.50 999.423 286.346
                                        37.389
                                                   33.622 -94.407
                                                                          19.061 -8.305
                                                                                                -.111 8.169
  4.30
         1.50 -639.083 -89.410
         1.50 -1564.181
                                        22.161 -367.690 -377.038
33.188 -277.814 -187.966
                                                                           26.229
                                                                                       1.103
                                                                                                24.301
  4.00
                                                                                     1.230 -34.362 62.294
  3.49
                                                                            12.954
                                                                            .452 -10.435 -26.193 -28.813
         1.50 -314.813 -84.408
                                        -6.143 -179.434 -139.151
  3.01
                                       -.985 -138.488 -104.819
                                                                             .329 -2.191 -27.639
-.979 -15.576 -42.641
         1.50 -268.484 -56.934
1.50 -186.684 -43.904
                                                                                                          4.730
  2.49
                                                   -96.896 -76.692
                                          5.534
                                                                                                           -2.171
  2.00
                            -42.592
                                         8.114
         1.50 -161.111
                                                   -67.795 -84.332
                                                                             9.888 -3.852 -20.890 14.014
  1.50
         1.50 -147.620
                            -32.839
                                          4.400
                                                   -63.300
                                                               -71.503
                                                                             7.818
                                                                                      -1.505 -20.031 19.861
   .99
                            -19.924
-1.584
         1.50 -108.408
                                                                                       -.949 -10.834
                                                                                                           18.052
                                           9.535
                                                   -36.163
                                                               -53.774
                                                                             1.410
   .51
                                        16.817 -13.298 -59.830
                                                                                        .958 -9.395
                                                                                                         9.992
         1.50 -110.191
                                                                             2.177
   .01
C FILENAME= H904A010.J 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=10 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
C 10 : No. of data points
                                                                                      w'^2v' w'^2u' u'^2w'
38.239 66.183 -146.811
                 u'^3 v'^3
                                         w'^3
                                                                           v'^2w'
                                                    u'^2v'
                                                               v'^2u'
Су
         x
  5.50 10.01 1500.343 519.230 -751.789 973.551 991.074
4.99 10.01 1219.310 144.546 -486.059 497.570 564.509
                                                   973.551 991.074
                                                                            11.632
                                                                            10.533 58.023 -137.637 -51.916
  4.51 10.01 1676.237 101.148 -233.420 266.977 368.915 50.763 77.499 -38.577 -9.652 3.99 10.01 -539.329 -93.486 108.955 -454.504 -384.402 -87.574 -47.072 -515.095 80.721 3.42 10.01 -2229.229 -297.130 381.252 -724.947 -628.557 -70.820 -99.085 -374.746 179.451 2.71 10.01 -1649.723 -529.960 182.244 -815.823 -667.387 66.059 -140.001 -187.364 239.204
        9.99 -423.350 -182.783
                                                                            23.750 -59.153 -81.761 10.545
                                          45.287 -243.969 -223.964
  2.01
               -205.297
                            -65.346
                                           6.829
                                                   -75.935 -105.923
                                                                           21.259 -17.382 -36.268
                                                                                                           34.529
  1.29
          9.99
                                                                            6.013 -3.279 -18.246 10.107
         9.99 -183.449
                            -34,609
                                         14.655
                                                   -54.972 -72.341
   .61
                                                                            8.030 -5.441 -16.867 17.205
         9.99 -100.498
                           -15.559
                                        11.564 -18.480 -56.015
C FILENAME= H904A025.J 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=25 mm
  LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
C 13 : No. of data points
                  u'^3
                             v'^3
                                         w'^3
                                                    u'^2v'
                                                              v'^2u'
                                                                           v'^2w' w'^2v' w'^2u' u'^2w'
          x
  7.99 25.00 977.075 -158.160 -298.843 133.423 1055.650
                                                                           -14.721 156.822 64.694 -118.765
  7.00 25.00 871.202 250.997 -659.128 485.428 1059.981
                                                                          -18.280 245.840 201.293 19.132
  6.01 25.00 1504.632 483.101 -679.601 978.518 1047.663
5.49 25.00 1647.525 547.012 -739.568 963.412 977.152
                                                                           -80.971 187.501 175.747 -181.917
8.983 69.464 182.307 -93.925
  5.00 25.00 2055.079 629.430 -764.984 1170.115 1163.896
                                                                           1.973 10.353 -47.545 -271.702

    4.50
    25.00
    2216.855
    493.959
    -949.510
    878.142
    908.115
    -4.232
    -198.974
    -285.979
    -206.187

    4.01
    25.00
    1980.300
    335.041
    -687.138
    584.853
    715.398
    -18.207
    74.973
    -198.564
    -200.243

    3.41
    25.00
    300.842
    -111.593
    -308.037
    -187.923
    122.601
    51.605
    -85.896
    -656.513
    -101.360

  2.70 25.00 -1803.820 -388.219 -120.195 -525.472 -502.404 150.973 -73.928 -651.395 63.310
  2.01 25.00 -3528.372 -543.008 193.288 -810.600 -975.761
1.29 25.00 -3221.464 -512.194 166.833 -843.166 -1009.862
                                                                           211.578 -192.569 -768.059 188.437
46.397 -69.392 -453.587 152.024
```

```
.60 25.00 -1400.272 -343.754 171.918 -699.435 -780.903 64.735 -10.271 -294.230 68.929
.00 25.00 -788.473 -79.021 165.906 -233.221 -466.609 20.953 -74.558 -248.264 140.958
C FILENAME= H904A050.J 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=50 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C 11 : No. of data points
   Y x u'^3 v'^3 w'^3 u'^2v' v'^2u' v'^2w' w'^2v' w'^2u' u'^2w' 8.81 49.99 1213.615 -338.572 -234.784 -111.733 956.595 -57.188 85.105 144.566 -59.658 8.20 49.99 1001.521 -583.750 -173.891 -86.589 1079.129 -103.691 89.046 228.786 -25.833

    8.20
    49.99
    1001.521
    -583.750
    -173.891
    -86.589
    1079.129
    -103.691
    89.046
    228.786
    -25.833

    7.01
    49.99
    964.263
    338.162
    -266.494
    593.638
    676.398
    -16.702
    64.042
    206.536
    -66.743

    5.99
    49.99
    1507.126
    305.707
    -281.496
    696.993
    911.175
    18.155
    158.789
    200.221
    -62.064

    5.00
    49.99
    1570.448
    587.548
    -198.574
    890.884
    960.158
    79.690
    124.887
    66.273
    -111.979

    3.99
    49.99
    2069.978
    537.756
    -358.374
    663.415
    914.544
    106.157
    144.145
    -207.342
    -188.758

   2.73 49.99 1707.440 308.915 -356.869 297.901 547.135 -18.711 66.779 -473.488 -21.753 2.01 49.99 1337.915 422.656 -277.936 300.943 624.791 38.799 88.267 -264.224 -63.041 1.29 49.99 276.218 138.511 -285.339 -131.024 59.949 -18.513 -12.054 -742.161 16.112 .60 49.99 25.660 88.117 -474.264 -221.925 -159.780 111.772 72.104 -603.351 -162.384
     .00 49.99 -794.691 29.938 -189.332 -239.487 -395.643 -53.545 -108.610 -688.034 16.818
C FILENAME= H904A075.J 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=75 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
C 11 : No. of data points
C y x u'^3
                                                                 u'^2v' v'^2u'
41.638 432.288
                                        v'^3
                                                      w'^3
                                                                                               v'^2w' w'^2v' w'^2u' u'^2w'
   9.50 75.00
                                     -23.465 -65.924
                                                                                               -21.873 61.130 123.121 -27.709
5.568 81.932 127.139 10.865
                       531.809
   8.20 75.00
                     395.974 125.791 -78.019 201.979 301.400
  7.00 75.00 602.141 51.170 -222.130 136.022 433.580 6.01 75.00 409.018 176.632 -75.785 217.709 336.319 4.99 75.00 504.520 160.756 -68.438 224.582 271.771
                     504.520 160.756 -68.438 224.582 271.771 20.640 65.310 52.185 -21.008 600.869 205.406 -24.367 164.102 274.595 -42.681 79.662 -11.682 -74.232 737.954 134.393 -184.252 185.213 278.497 6.588 44.000 -47.358 -34.056 615.494 95.018 -58.835 120.374 241.365 .396 41.363 -99.401 -41.977 549.224 51.938 96.693 85.572 247.444 2.810 11.069 -190.141 -101.023 599.583 90.837 -98.389 57.442 209.339 -4.916 -13.656 -211.639 7.398 538.433 3.630 -127.781 6.357 188.076 9.584 50.017 -142.312 -62.312
                                                                                                 3.241 62.268 90.861 -12.094
  4.01 75.00
2.72 75.00
   2.01 75.00 615.494
  1.29 75.00
.61 75.00
    .00 75.00 599.583 90.837
C FILENAME= H904A150.J_2
C H2 FLAME; d=9.45, d=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=150 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
  9 : No. of data points
                                       v'^3
                     u'^3
                                                                               v'^2u'
           х .
                                                    w'^3
                                                                  u'^2v'
                                                                                              v'^2w'
                                                                                                            w'^2v' w'^2u'
                                                     6.336 21.769
 13.99 150.00
                        88.409
                                       17.314
                                                                                  38.022 -1.616
                                                                                                            5.307 21.516 -3.870
 12.00 150.00
                      51.915
                                                                  5.637
                                       16.482
                                                       3.257
                                                                                  22.672
                                                                                              1.975
                                                                                                               7.856 10.103 -4.040
5.522 5.090 -7.812
                     49.379
                                                                     .652 20.044
 10.01 150.00
                                    12.475
                                                     15.470
                                     13.025
                                     13.025 7.489 1.051
7.239 7.154 -6.056
4.027 10.470 -7.079
  7.99 150.00
                        31.907
                                                                    1.051 24.658
                                                                                                 -.829
                                                                                                            1.599
                                                                                                                            2.508 -2.920
                                                                               8.974
  5.99 150.00
                        14.655
                                                                                                            .520 -8.287
-1.535 -6.961
                                                                                                 2.752
                                                                                                                                       -5.646
                                                                                   1.725
  3.98 150.00
                       1.962
                                                                                                -1.657
                                                                                                                                       -6.110
  2.01 150.00
                        9.025
                                      2.670 4.973 1.069
                                                                                                -2.484 -2.633 -10.198 -10.916
                                                                                  5.065
                                                     -2.305 2.226
7.307 5.199
  1.00 150.00
                        -4.618
                                        2.686
                                                                                   -.036
                                                                                                .415
                                                                                                              .456 -11.408 -10.865
                                      3.398
                       3.273
    .01 150.00
                                                                     5.199
                                                                                  -.162
                                                                                                   .442
                                                                                                              -1.480 -16.259 -9.154
C FILENAME= H904A225.J 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=225 mm
C LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
   D090894
C 10 : No. of data points
                     u'^3 v'^3
                                                    w'^3
                                                                                              v'^2w'
           x
                                                                   u'^2v'
                                                                               v'^2u'
                                                                                                            w'^2v'
                                                                                                                         w'^2u'
                                      3.213
                                                                                                                                      u'^2w'
                                                                               5.452
 18.00 224.99
                                                                  .059
                        8.629
                                                      5.468
                                                                                                .055
                                                                                                            -1.305 -2.937
                                                                                                                                       1.445
                                      6.529
3.564
 16.00 224.99
                       14.566
                                                    18.224
                                                                     4.117
                                                                                   8.021
                                                                                 8.0<u>-</u>
3.092
                                                                                                  -.004
                                                                                                             1.794 2.929
                                                      7.045
                                                                                                                                         -.337
                                                                                                            .739
 13.99 224.99
                                                                  -1.925
                        9.662
                                                                                                 .988
                                                                                                                            -.074
                                                                                                                                        -4.843
                       7.053 1.613 5.031 .527 4.634
7.805 1.842 14.391 .148 5.085
2.671 .992 5.677 -2.171 4.382
                                                                                 4.634
 12.00 224.99
                                                                                                               -.399 -1.531 -1.780
                                                                                                -1.551
 10.01 224.99
                                                                                                 .477
                                                                                                             -1.147 -6.187
                                                                                                                                       -3.632
  7.99 224.99
                                                                                                  1.255
                                                                                                            -1.259 -1.173 -1.593
```

```
1.219 -2.278 -4.618
                                                                                    -.650
                      -1.627
              11.018
                                  3.686
                                          -.484
                                                    2.333
 5.99 224.99
                                                             .451
                                                                     .549 -4.284
                                 2.024
                                        -1.332 1.720
                                                                                    -1.710
                        -.989
                7.750
 3.98 224.99
                                                    2.366
                                                             1.381
                                                                    -1.493
                                                                            -2.895
                                                                                    -2.201
                4.142
                        -.623
                                 7.522
                                         -1.375
 2.00 224.99
                                                                           -3.146
                                          1.106
                                                                                     . 458
                3.945
                        -1.530
                                9.554
                                                    2.582
                                                             2.153
                                                                    -2.147
  .00 224.99
C FILENAME= H904A001.A 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=1.5 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090493
C 10 : No. of data points
                                                           v'^2w' w'^2v'
                                                                          w'^2u'
              u'^3
                       v'^3
                                 w'^3
                                         u'^2v'
                                                  v'^2u'
Су
        x
                                                           -8.620 -12.826 1.858
                                                                                    -6.755
                       -23.285
                               -83.472 -13.710 -10.402
               -5.925
 13.49
       1.50
                                                            -2.921 -6.728
                                                                             -.375
                                                                                    -1.563
                       -9.462
                               -15.717 -4.878 -2.859
 13.01
       1.50
              -1.850
                                                                              .381
               -.105
                                                            -2.616
                                                                    -2.903
                                                                                     -.482
                       -8.164
                                -3.061
                                         -1.330
                                                  -1.533
 12.51
       1.50
                                                            -2.257
                                                                   -1.285
                                                                              .225
                                                                                     -.327
                                                   -1.297
                .171
                        -5.943
                                -1.956
                                          -.475
 12.01
       1.50
                                                                     .053
                                                                              .212
                                                   -.074
                                                            -1.348
                                                                                     -.653
                       -2.405
                                 -.682
                                           .173
       1.50
                -.182
 11.19
                        -.651
                                -1.647
                                                    -.420
                                                            -1.547
                                                                     2.229
                                                                            -1.165
                                                                                     -.984
       1.50
               -.769
                                           1.119
 10.40
                                                                     .149 -2.538
.066 -5.885
                                                                                    -1.856
                         1.820
                                  .926
                                           2.140
                                                   -2.423
                                                            -.783
       1.50
               -4.144
 9.60
                        3.120
                                 -5.566
                                          7.283 -6.896
                                                           -.404
                                                                                    -6.239
             -35.480
 8.20
       1.50
                                                            .876
                                                                           -2.116
-2.373
                                                  -6.035
                                                                     1.198
                                                                                     3.235
               -9.735
                        5.240
                               -7.746
                                          3.307
  6.99
       1.50
                                                              .797
                                                                     .841
                                                                                     6.300
               4.307
                        -.256
                                6.627
                                         -1.304
                                                  -3.151
       1.50
  6.01
C FILENAME= H904A010.A 2
C H2 FLAME; d=9.45, d=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=10 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
  9 : No. of data points v x u'^3
                                                           v'^2w' w'^2v' w'^2u'
                                         u'^2v'
                                                                                    u'^2w'
                        v'^3
                                 w'^3
                                                 v'^2u'
С
                       -21.878
                                         6.080 -1.053
                                                           1.370 15.604
                                                                           3.048
                                                                                    1.249
               15.149
                               22.540
18.00
      9.99
                      -63.400
                               -46.111
                                                           -19.694 -12.152 -10.675
                                                                                   -19.312
             -52.885
                                         -46.909
                                                  -44.958
 16.00 9.99
                                                           -4.103 -3.065
                                                                            -.375
                                                                                    -1.387
              -1.385
                       -14.211
                                -8.908
                                         -4.748
                                                   -4.110
 13.99
       9.99
                               -7.836
                                           .001
 13.02 10.00
              -3.993
                        -4.179
                                                   -.097
                                                            -.463
                                                                    1.453 -3.514
                                                                                    -4.069
                                                            -.310
-.042
                                         -1.211
                                                                    -1.282
                                                                             -.913
                                                                                    -3.439
                                 -.475
                                                   -.488
 11.98 10.00
              -8.503
                        -.222
                                                                    -1.753 -2.701
                                         -2.994
                                                   -2.440
                                                                                    -3.724
 11.01 10.00
             -17.079
                        -.340
                                  3.332
                                         -5.148
                       -1.134
                                                   -5.293
                                                             -.310
                                                                     -.287 -3.701
                                                                                    -1.942
 10.00 10.00
             -15.989
                                -2.488
                                                                     .422 -1.793
-.781 -8.716
                                                                                      .500
             -27.138
                                                             -.888
                       -5.786
                               -1.832
                                         -13.130 -11.144
 9.01 10.00
                                                            -.254
                                                                     -.781
                                                                                      6.007
             -40.316 -15.348
                                 .585
                                         -18.341
                                                 -34.702
  8.01 10.00
C FILENAME= H904A025.A 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=25 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
C 15 : No. of data points
               u'^3
                                                                                    u'^2w'
                                         u'^2v' v'^2u'
                                                           v'^2w' w'^2v' w'^2u'
                        v'^3
                                  w'^3
       x
  У
                                                          7.334 19.208 1.407
                                                                                    1.896
                                        15.485 9.112
                        15.751
 24.00 25.00
               28.143
                               19.350
                                         9.058
             19.765
                                                             4.694
                                                                    6.174
                                                                             3.471
                                                                                     2.082
                        9.824
                                 6.484
                                                    6.452
 23.00 25.00
                                           -.639 -10.410
                                                            -1.454 -1.337
                                                                           -1.539
                                                                                     5.145
       25.00
                7.106
                        -8.662
                                 -3.983
 22.00
                                                                           -8.884
                      -40.500 -22.988
                                         -19.761 -25.314 -11.912 -3.984
                                                                                    -9.016
 21.00 25.00
             -29.516
                                                           -9.651 -14.395 -18.837 -10.514
-18.753 -14.263 -18.803 -13.220
                      -30.721
-59.012
             -43.304
                                         -30.203
                                                  -34.511
                                -25.837
 20.00 25.00
                               -29.484
                                         -42.743 -47.637
             -58.178
 19.00
       25.00
                                         -36.616 -43.162
                                                                                   -9.618
                      -46.437
                                                           -17.986 -11.454 -12.044
             ~39.031
                               -30.429
 18.01 25.00
                               -14.870
                                        -21.814
-7.959
                     -41.502
-34.318
                                                  -28.081
                                                           -10.134 -10.576
                                                                            -7.704
                                                                                    -8.116
 16.98 25.00
             -24.926
                                                           -5.939 -3.383 -3.899
                                                                                    -5.548
 16.01 25.00
             -14.434
                                -6.744
                                                  -15.139
                                                            -1.129 -1.147 -4.037
                                                                                    -6.121
             -15.050
                      -22.616
                                -3.679
                                         -3.402
                                                   -5.010
 14.99 25.00
                                                    .100
                                                                     -.747
                                                                            -2.609
                                                                                    -4.757
             -20.698
                       -16.280
                                -3.421
                                          -5.376
                                                            -1.124
 14.01 25.00
                                                                     .710 -1.293
                                                    1.046
                                                            -1.586
                                                                                    -1.036
 13.01 25.00
             -21.905
                       -13.500
                                 -1.857
                                          -4.922
                                                            -2.982 -2.277
                                                                           -5.547
                                                                                    3.035
                                                   -8.111
       25.00
             -37.943
                       -15.203
                                 -4.499
                                         -10.749
 12.00
                                          5.851
                                                  ~50.609
                                                            1.134 10.146 -13.087
                                                                                     8.127
             -15.850
                        78.862
                                 -2.335
 11.01 25.00
                                                                     5.868 -12.300
                                                  -22.945
                                                            -4.717
                                                                                    11.965
                                  3.657
                                          -2.183
 10.99 25.00
             -13.486
                       13.453
C FILENAME= H904A050.A 2
C H2 FLAME; d=9.45, d=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=50 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
C 14 : No. of data points
                                                            v'^2w' w'^2v'
                                                                            w'^2u'
                                                                                    u'^2w'
                                                   v'^2u'
              u'^3
                       v'^3
                                  w'^3
                                          u'^2v'
       x
Су
                                 -8.777
                                                   -8.459 -3.432 -4.625 -2.815 -1.879
                                          -4.633
                        -2.218
 26.00 50.01
               -2.568
```

```
24.00 50.01 -11.799
                         -5.122
                                   -9.852
                                            -7.777
                                                     -9.499
                                                               -3.256
                                                                       -6.714
                                                                               -5.293
                                                                                        ~5.003
 22.00 50.01 -10.761
                         -1.084
                                   -7.424
                                                                      -5.923
                                            -6.959
                                                    -11.043
                                                               -3.590
                                                                                -5.022
                                                                                        -3.975
 20.00 50.01
                -9.185
                         -9.749
                                   -8.541
                                            -5.138
                                                    -11.228
                                                               -4.891
                                                                       -4.496
                                                                                -4.877
                                                                                         -3.908
 18.00 50.01
               -11.830
                         -9.245
                                  -10.233
                                            -3.064
                                                     -8.083
                                                               -4.810
                                                                       -4.508
                                                                                -2.785
                                                                                         -.884
 15.99 50.01
                -5.843
                         -6.655
                                  -8.959
                                            -2.698
                                                     -4.773
                                                               -2.769
                                                                       -2.617
                                                                                -3.202
                                                                                        -1.199
 15.01 50.01
               -9.020
                         -3.571
                                   -6.577
                                             .867
                                                     -5.602
                                                               -1.670
                                                                      -1.479
                                                                                -3.375
                                                                                        -3.376
 14.01 50.01
               -10.020
                         -1.545
                                   -8.092
                                             1.257
                                                     -3.334
                                                               -1.742
                                                                      -1.865
                                                                                -3.540
 13.00 50.01
                -7.186
                          -.185
                                   -7.561
                                             2.141
                                                     -4.152
                                                               -1.193
                                                                       -1.391
                                                                                -3.447
                                                                                        -2.811
 12.00 50.01
               -12.936
                          3.241
                                   -6.242
                                             3.776
                                                     -3.340
                                                                .994
                                                                        1.382
                                                                                -2.123
                                                                                        -1.842
 11.01 50.01
               -3.329
                          7.539
                                   -3.254
                                             4.579
                                                                2.383
                                                       .777
                                                                        2.798
                                                                                -.946
                                                                                         .125
  9.99 50.01
                 6.082
                          9.681
                                   -.559
                                             3.114
                                                      2.330
                                                               5.152
                                                                                1.600
                                                                                        -1.403
                                                                        5.756
  9.00 50.01
                         63.112
                66.759
                                   40.614
                                            30.534
                                                      39.933
                                                               24.495
                                                                       37.713
                                                                                39.893
                                                                                        11.878
  8.00 50.01 1482.532 554.266 108.120 626.203
                                                             85.488 288.449 401.674
                                                    494.268
                                                                                        17.732
C FILENAME= H904A075.A 2
C H2 FLAME; d=9.45, d=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=75 mm
  LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
C 18 : No. of data points
               u'^3
                         v'^3
         x
                                   w'^3
                                            u'^2v'
  V
                                                     v'^2u'
                                                               v'^2w'
                                                                       w'^2v'
                                                                                พ'^2น'
                                                                                        11 1 ^ 2 w !
 26.00 75.00
                 .590
                         -3.416
                                   -1.976
                                            -2.414
                                                             -2.267
                                                     -4.236
                                                                       -2.139
                                                                               -2.196
                                                                                         -.632
 24.00 75.00
                -1.013
                         -1.456
                                  ~4.800
                                           -1.586
                                                                      -3.070
                                                     -2.741
                                                                -.902
                                                                                -.721
                                                                                         -.381
 22.00 75.00
                -.408
                         -2.902
                                                                      -2.456
                                   -3.131
                                            -2.390
                                                     -3.300
                                                              -2.032
                                                                                -.768
                                                                                         -.317
 21.00 75.00
                 .237
                         -3.340
                                   -2.403
                                            -1.896
                                                     -2.666
                                                            -1.502
                                                                      -1.787
                                                                                -.556
                                                                                         -.655
                                                            -1.622
 20.00 75.00
                 -.948
                         -1.819
                                   -2.080
                                            -.909
                                                     -1.776
                                                                       -1.057
                                                                                -.935
                                                                                        -1.398
 19.00 75.00
                 .585
                         -2.369
                                  -2.375
                                            -1.359
                                                     -1.704
                                                              -2.018
                                                                       -2.947
                                                                                -.113
                                                                                        -1.065
 18.01 75.00
15.99 75.00
               -2.955
                         -2.027
                                  -2.135
                                            -.663
                                                     -1.487
                                                              -1.526
                                                                      -1.455
                                                                                -.147
                                                                                        -.946
                -1.191
                         -2.001
                                  -3.036
                                             -.381
                                                      -.243
                                                              -1.061
                                                                        -.642
                                                                                -.938
                                                                                        -1.338
 13.99 75.00
                                                                        .117
                                                                                1.164
                 3.261
                          3.248
                                  -4.368
                                             2.775
                                                      1.783
                                                              -1.264
                                                                                        -1 385
 11.99 75.00
                 5.033
                         3.590
                                   -4.230
                                            1.486
                                                      3.448
                                                               1.457
                                                                         .491
                                                                                 2.645
                                                                                        -1.961
 11.01 75.00
                23.011
                          5.292
                                  -3.766
                                            5.996
                                                      6.248
                                                                3.694
                                                                        3.568
                                                                                 7.754
                                                                                       2.213
  9.99 75.00
              105.041
                                                                      24.259
                         23.111
                                   7.264
                                           24.183
                                                     33.946
                                                              15,162
                                                                               50.218
                                                                                        4.970
  9.00 75.00
              587.502 102.217
                                  42.093 168.146 152.955
                                42.093 168.146 152.955 30.742 79.041 146.718 7.658 -15.012 435.133 359.142 17.150 151.681 278.394 -2.199
       75.00 1262.213 298.215
  8.00
                                 -83.222
  5.99
       75.00 1524.565
                                          539.558 517.528
                        511.607
                                                            24.770 203.558 308.123 -67.599
  5.01 75.00 1358.027
                        568.282 -237.542
                                           384.595
                                                    420.032
                                                               48.337 222.952 251.700 -13.294
22.557 162.566 124.919 -109.576
  4.00 75.00 1475.883
                       413.008 -267.594 295.475 259.708
  3.02 75.00 1280.919
                       466.983 -212.306 142.659 135.473
                                                               -.824 150.240 19.238 -106.106
C FILENAME= H904A150.A 2
C H2 FLAME; d=9.45, d=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=150 mm
C LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
  D090894
C 14 : No. of data points
                        v'^3
       x u'^3
                                                   v'^2u'
-.565
Су
                                  w'^3
                                           u'^2v'
                                                              v'^2w'
                                                                      w'^2v'
                                                                               w'^2u'
                                                                                        u'^2w'
 26.00 149.99
                -.048
                          -.717
                                   -.820
                                           -.628
                                                              -.092
                                                                      -.611
                                                                               - 396
                                                                                         .195
                 .101
 24.00 149.99
                         -.691
                                   -.894
                                            -.390
                                                      -.368
                                                               -.320
                                                                       -.428
                                                                                 .079
                                                                                         -.130
 22.00 149.99
                         -.327
                 . 704
                                   -.636
                                            -.477
                                                      -.357
                                                               -.202
                                                                        -.335
                                                                                 .241
                                                                                         .247
 20.00 149.99
               2.528
                        -.300
                                             .145
                                                      .217
                                   -.604
                                                                .047
                                                                        -.140
                                                                                  .749
                                                                                         .753
 18.00 149.99
                6.034
                          .535
                                   .133
                                             .881
                                                       .968
                                                                .605
                                                                         .274
                                                                                2.207
                                                                                          .762
 16.00 149.99
               25,246
                         2.491
                                   2.485
                                             4.920
                                                      4.245
                                                               1.794
                                                                        1.747
                                                                                7.544
                                                                                         4.873
                                           22.390 20.418
 13.99 149.99
               89.544
                         9.160
                                   4.978
                                                               -.181
                                                                        7.196
                                                                               19.436
                                                                                         .464
 12.00 149.99 186.414
                        41.903
                                  3.688 62.390 52.418
                                                               6.030 18.022
                                                                               40.489
                                                                                         2.177
 10.01 149.99
               182.300
                         46.459
                                   2.556 61.187 56.076
                                                              3.951
                                                                      25.547
                                                                               45.144 10.518
              136.887
 7.99 149.99
                         47.434
                                 -10.718
                                            33.851
                                                     44.106
                                                                .318
                                                                      23.042
                                                                               29.638 -7.971
 5.99 149.99
               97.374
                         46.881
                                  -2.409
                                          21.511
                                                     31.553
                                                               1.650
                                                                       22.658
                                                                               15.455
                                                                                         2.219
 3.98 149.99
                         28.292
                67.483
                                  -2.303
                                            5.764
                                                   14.848
                                                              -2.320
                                                                      12.256
                                                                                -.869
                                                                                         9.312
 2.01 149.99
                44.979
                         18.055
                                  -4.916
                                          -10.874
                                                    -3.203
                                                              -1.115
                                                                        5.904
                                                                               -3.168
                                                                                         6.192
   .00 149.99
               26.562
                         16.224 -11.621
                                                   -13.506
                                           -8.923
                                                               -.689
                                                                        5.930 -19.366
                                                                                         3.623
C FILENAME= H904A225.A 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=225 mm
  LDV SEED PARTICLES ADDED TO ANNULUS FLUID ONLY.
C D090894
C 14 : No. of data points
                       v'^3
              u'^3
       x
                                   w'^3
                                          u'^2v'
                                                    v'^2u'
                                                              v'^2w'
                                                                       w'^2v'
                                                                               w'^2111
                                                                                        u'^2w'
                       .624
 26.00 224.99
                2.036
                                   .580
                                            .307
                                                      .675
                                                               .431
                                                                        .709
                                                                               1.060
                                                                                        .654
 24.00 224.99
                6.419
                           .669
                                   1.455
                                             1,621
                                                      1.059
                                                                .367
                                                                        1.049
                                                                                2.209
                                                                                         1.353
```

```
2.267
3.384
20.00 224.99 10.805
18.00 2
                                                   1.726 .925
4.665 1.347
7.868 2.219
                                                                             2.990
                                                                       .868
                                                                                       2.687
                          .950
                                                               .925
                                           6.311
                       2.649
                                                                       2.158 5.814
                                                                                      3.248
                                                             2.219
                                                                       3.708
                                                                              9.071
                                                                                       4.559
                                 3.716 11.236
 18.00 224.99
             44.906
                        3.981
                                 3.598 19.708 13.475
6.541 19.062 17.207
4.177 18.286 18.125
                                                              2.624
                                                                       4.242
                                                                              12,121
             71.961
                         7.448
 15.99 224.99
                                                                       6.915 16.098
                                                                                       6.046
                        13.968
                                                              1.073
 13.99 224.99
              63.103
 11.99 224.99
                      14.681
                                                                       6.971 12.562
                                                               .526
              61.213
                                                              1.764
                                                                       6.695
                                                                              9.724
                                                                                       2.896
 9.99 224.99 30.598 14.387
                                 5.400 7.348 13.563
                                  1.856
5.934
                                           .755 9.210
6.089 3.871
                                                              .296
                                                                       4.509
                                                                               7.989
                                                                                       5.047
 7.99 224.99
             19.353 13.860
                                                               .908
                                                                       2.152 2.067
                                                                                      -1.692
 5.99 224.99
               24.377
                      8.534
5.631
                         8.534
                                                                                       .021
                                 5.181 -3.297
             10.643
                                                   1.010
                                                              -.373
                                                                       3.278
                                                                              -.562
 3.98 224.99
                                 4.476 -5.260 -2.772
3.847 -.170 -.672
             6.313
                      6.161
                                                               .371
                                                                       .778
                                                                              -1.735
                                                                                        . 921
 2.01 224.99
                                                                       2.862 -2.406 -3.484
  .00 224.99
                3.772
                       2.779
                                                              1.060
C FILENAME= H904A001.E 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=1.5 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894
C.
 8 : No. of data points
Су
               u'^3
                         v'^3
                                 w'^3
                                           u'^2v'
                                                  v'^2u'
                                                           v'^2w' w'^2v' w'^2u'
                                                                                     u'^2w'
        x
                .002
                                  .010
                                                                               .001
                                                                                      .003
                          .004
                                          .002 .000
                                                           .003 .005
 26.00
      1.50
      1.50
                                                                                        .001
                          .001
                                   .008
                                             .002
                                                     -.001
                                                               .002
                                                                       .002
                                                                               -.002
 24.00
                -.003
                                            .004
                          .002
                                   .006
                                                    -.003
                                                               .002
                                                                       .001
                                                                              -.003
 22.00
               -.004
                                                              .002
                                                                       .005
                                                                              -.003
                                                                                        .005
                                   .010
                                            .002
20.00 1.50
               -.005
                          .004
                                                   -.004
                                         .011 -.011 .001 .014 -.010
.177 -.346 1.135 .194 .073
37.476 44.052 30.608 17.284 11.561
      1.50
                                   .003
               -.052
                         -.008
                                                                                        .000
 18.00
                                7.318
      1.50
1.50
                                                                                        .164
16.00
               -.187
                         1.777
                                                                                      22.721
               47.760
                      87.021 122.296
15.01
             -22.662 19.084 -56.151 -10.885 -1.843
                                                              .629
                                                                      1.372
                                                                               -.495
                                                                                      -4.107
14.01 1.50
C FILENAME= H904A010.E 2
С
C H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=10 mm
 LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
С
C D090894
C 8 : No. of data points
                                                                                     u'^2w'
              u'^3
                                 w'^3
                                                   v'^2u'
-.006
                                                             v'^2w' w'^2v' w'^2u'
                        v'^3
                                          u'^2v'
с у
        x
                          .004
                                  .006
                                           .002
                                                             .002
                                                                            -.003
                                                                                      .000
26.00 10.00
                                                                     .005
                -.009
                                                                       .007
                                                              -.006
                                                                              -.006
                                                                                       -.004
                -.034
                         -.011
                                   .013
                                             .006
                                                     -.017
 24.00 10.00
                                                             -.034
                                           .028
                                                    -.136
               -.191
.293
                          .070
                                                                       .029
                                                                              -.084
                                                                                       -.040
 22.00 10.00
                                  -.038
                                            .295
                                                     .346
                                                                               -.312
 20.00 10.00
                         1.687
                                  1.530
                                                              .814
                                                                       .336
                                                                                        .476
                                                             41.109 24.155 14.490
18.00 10.00
              56.456
                      86.368
                                62.111 39.947
                                                   45.382
                                                                                      17,706
             -33.263
                      9.733
-13.660
                                -37.281
-45.635
                                                                             -5.029
                                         -25.004
                                                   -16.959
                                                             2.167
                                                                     -8.660
                                                                                      -5.941
 16.00 10.00
                                         -23.058 -18.064
                                                             -8.832 -16.744 -11.494
15.01 10.00 -38.814 -13.660 -45.635 -23.058 -18.064 14.00 10.00 -28.933 -18.602 -31.308 -20.766 -19.040
                                                                                      -3.107
                                                             -4.176 -8.800 -4.879 -3.905
C FILENAME= H904A025.E 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=25 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894
C
 7 : No. of data points
                                 w'^3
             u'^3
                       v'^3
                                w'^3 u'^2v' v'^2u'
1.869 1.580 .792
30.772 26.391 32.207
                                                             v'^2w'
                                                                    w'^2v' w'^2u'
2.314 .081
                                                                                      u'^2w'
Су
       х
 26.00 25.00
                1.337
                         4.848
                                                             1.790
                                                                               .081
                                                                                     .256
                                                             21.552 21.005 16.950
                                                                                      11.670
 24.00 25.00
              37.077
                       56.721
                                41.047 42.701 48.308
-2.579 13.348 17.143
                                                                      19.177 18.620
1.356 -4.018
                      94.810
                                                             21.473 19.177
                                                                                      15.777
             67.380
 22.00 25.00
                                 -2.579
 20.00 25.00
               15.244
                        53.678
                                                              9.521
                                                                                       4.575
                       17.598
                                -13.758 -11.960 -11.977
                                                             -4.780 -5.423 -6.073
                                                                                      -4.374
 18.00 25.00
              -23.373
                                                             -5.167 -9.582 -6.800
-1.614 -1.629 -7.692
              -25.913
                       -6.765
                                -16.906 -18.931 -22.473
                                                                                      -4.369
 15.99 25.00
                                                                             -7.692 -6.558
             -25.144
                       -4.769 -10.801
                                           4.431 -7.538
 13.99 25.00
C FILENAME= H904A050.E 2
C H2 FLAME; d=9.45, d=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=50 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C 11 : No. of data points
               u'^3
                                  w'^3
                                          u'^2v'
                                                    v'^2u'
                                                             v'^2w' w'^2v' w'^2u'
                                                                                      u'^2w'
                         47173
       х
                                                           6.739 5.253 4.758
                                                                                      2.182
               21.025
                        37.468
                                3.658
                                         10.320 12.806
 26.00 50.00
                                                             2.730
              9.394
                                  -.027
                                                    -.090
                                                                       2.298
                                                                               .482
                                                                                      -1.257
                                          1.702
                        25.371
 24.00 50.00
                                                                       .306 -2.261
 22.00 50.00
                5.222
                        12.221
                                 -4.962
                                           -2.538
                                                    -4.737
                                                              1.233
                                                                                      -2.764
                                                    -7.280
                                                             -4.468 -2.054 -1.767 -1.628
                                -4.188
                                           -2.904
 20.00 50.00
                         2.970
               -5.037
```

```
-2.767
 18.00 50.00
                 -5.709
                              2.050
                                        -7.401
                                                                        -2.735 -2.317 -4.538
-3.665 -1.115 -2.353
                                                             -8.440
                                                                                                     -2.480
 17.00 50.00 -3.331 2.765 -5.623
                                                   -.430
                                                             -6.552
                                                                                                      -1.092
                  -8.717
 16.01 50.00
                              .593 -10.185
                                                             -9.456 -2.203 -1.279
                                                   1.844
                                                                                            -3.145
                                                                                                      -2.675
                                                             -3.767
 14.99 50.00
                 -16.327
                               -.389
                                                   5.318
                                        -8.967
                                                                        -1.138 -1.331
                                                                                            -2.668
                                                                                                      -4.981
 14.01 50.00 -9.746
                             1.204
                             1.204 -5.939 4.580
2.290 -8.426 6.442
                                                              -5.277
                                                                        -3.366
                                                                                    .192
                                                                                            -1.204
                                                                                                      -5.179
                                                             -3.097 -1.171
                                                                                    1.019
 13.00 50.00 -6.597
                                                                                            -2.374
                                                                                                     -4.111
 12.00 50.00
                  -,259
                             3.458 -11.245 5.269 -1.640 -4.263
                                                                                    .398 -3.027 -5.386
C FILENAME= H904A075.E 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=75 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894
C 15 : No. of data points
                             6.618 -1.314 - 102
c y
          x u'^3
                            · v'^3
                                                                                          w'^2u'
                                                                        v'^2w'
                                                             v'^2u'
                                                                                 w'^2v'
                                                                                                      u'^2w'
                    .373
                                                  -.103
 26.00 75.00
                                                             -2.065
                                                                                 -1.936
                                                                         -.597
                                                                                            -.466
                                                                                                      -1.314
 24.00 75.00
22.00 75.00
                                                   -3.085 -3.170 -3.087 -1.330

-307 -3.042 -1.723 -2.585 -.417

.132 .708 -4.920 -1.883 -2.363

.777 -2.057 -1.069 -2.000
                -2.670
-.549
                           -.998 -4.176
.545 -3.491
                            .545 -3.491
-3.945 -^
                                                                                                     -1.587
                                                                                                       .470
 20.00 75.00 -6.023
                                                                                                       -.092
 19.00 75.00 -2.250 1.254 -3.341
                                                                                                       -.797

    18.01
    75.00
    -3.151
    -.808
    -2.671
    .792
    -.961
    -1.930
    -1.436
    -1.364
    -1.842

    17.00
    75.00
    -2.196
    .848
    -3.514
    1.069
    -.970
    -.587
    -.988
    .051
    -1.536

    16.00
    75.00
    -.932
    .250
    -4.067
    .013
    .479
    -1.095
    -2.097
    -.714
    -1.185

 15.01 75.00 -1.932 .250 -4.067 .013 .479 -1.095 -2.097 -.714 -1.185
15.01 75.00 -1.151 1.867 -3.466 1.006 1.343 -1.415 -1.349 .462 -.689
14.01 75.00 -1.981 1.302 -4.178 1.808 1.652 -1.410 -.358 .083 -2.204
13.01 75.00 3.799 4.388 -5.162 2.040
                                       -5.162
-2.774
                             4.388
5.260
                                                  2.942 4.580
2.850 4.409
6.829 11.762
                                                                         .739
                                                                                  1.847 1.255
                                                                                                      -.264
 12.00 75.00 12.068
                                                                          1.940
                                                                                  2.920 3.409
                                                                                                     -1.330
                                                                         3.529
                                        -6.491
 11.01 75.00 22.515
                             9.612
                                                                                    6.108
                                                                                             7.994
                                                                                                     -1.430
                             15.632 -7.920 17.310 18.623
42.803 -41.544 63.525 72.571
  9.99 75.00
                  88.565
                             15.632
                                                                          4.399 12.292 39.071
                                                                                                      .853
  9.01 75.00 312.236
                                                                        2.144 41.222 87.004 -18.839
C FILENAME= H904A150.E 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=150 mm
  LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
  D090894
                                      w'^3 u'^2v' v'^2u' v'^2w' w'^2v' w'^2u' u'^2w' -.369 .454 .176 -.220 -.155 .798 -.077 -.306 -.063 -.154 .147 -.020 .330
  6 : No. of data points
        x u'^3 v'^3
                           -.017
.112
                  1.466
 26.00 150.00
                                                                                 -.155 .798 -.077
 24.00 150.00
                    .801
                                                                         .147
                                                                                              .372
                                                    .435
                  1.077
 22.00 150.00
                                         .324
                                                              .336
                                                                          .078
                                                                                   .220
                                                                                                       .338
                                                                                              .463
                19.978
 18.00 150.00
                                        1.446 3.584 4.292
                           2.796
                                                                          .631 1.455
                                                                                             4.615
                                                                                                        .208
                          5.520 -1.398 13.541 10.015 1.132
24.685 -3.438 39.477 30.591 .773
 16.00 150.00
                  50.593
                                                                                   4.317
                                                                                            11.558
                                                                                                      1.191
 13.99 150.00 131.633
                                                                                   9.948
                                                                                            22.168
                                                                                                     -7.519
C FILENAME= H904A225.E 2
C H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=225 mm
C LDV SEED PARTICLES ADDED TO EXTERNAL FLUID ONLY.
C D090894
C 10 : No. of data points
        x u'^3
24.99 4.670
                           v'^3
                                       w'^3
                                                u'^2v'
                                                           v'^2u' v'^2w' w'^2v' w'^2u' u'^2w'
                                                           .666
                                       -.095 -.215 .666

-.008 5.083 3.948

.872 4.561 3.967

-.067 12.228 9.785

-1.384 11.728 12.351

-2.712 7.300 11.342
 26.00 224.99
                              .982
                                                                      .690
                                                                                 .775
                                                                                           1.909 .045
 24.00 224.99
                23.052
                            2.560
                                                                          .793
                                                                                   1.936
                                                                                             5.454
                                                                                                      1.599
                20.261
                            2.947
                                                                      1.325
 22.00 224.99
                                                                                 1.690
                                                                                             3.801
                                                                                                      .402
                          6.714
11.957
 20.00 224.99
                  43.355

    9.785
    1.021
    2.428

    12.351
    1.346
    3.423

                                                                                             7.914 -.319
                                                                         -.428
-.346 3.423
.405 4
                41.803
 18.00 224.99
                                                                                             6.735
                                                                                                      - .839
                                                                                   4.840
 15.99 224.99
                26.213 13.479 -2.712
                                                                                             8.233 -1.768
                            11.733
10.173
                                       -.465
-1.327
 13.99 224.99
                  15.892
                                                   5.236
                                                             8.511
                                                                          .096 2.861
                                                                                             5.615
                                                                                                     3.540
 11.99 224.99
                  34.894
                                                   9.680
                                                                        .060 3.571
-1.385 3.067
                                                            10.438
                                                                                             5.945 1.188
                                        -.766 3.773
 10.00 224.99
                                                            5.817
                  11.088
                             8.105
                                                                         -1.385 3.067 1.866 3.008
.099 2.553 1.777 4.672
  8.00 224.99
                            4.208 -4.123 1.280
                  10.024
                                                              .678
C FILENEME= H904AAX.J_2
   H2 FLAME; d=9.45, delta=1.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; y=0 mm
   LDV SEED PARTICLES ADDED TO JET FLUID ONLY.
C D090894
C 22 : No. of data points
Су
        x u'^3 v'^3
                                        w'^3
                                                 u'^2v'
                                                            v'^2u'
                                                                        v'^2w' w'^2v'
                                                                                            w'^2u'
                                                                                                     u'^2w'
   .00 1.50
               -96.780 -15.799
                                        5.647 -14.518
                                                           -59.957
                                                                      3.293
                                                                                 .294
                                                                                           -9.571
                                                                                                      3.772
```

```
.00 10.00 -126.950
.00 20.00 -263.847
                                                                       -5.289 -17.162
                       -22.548
                                   2.528
                                           -18.440
                                                    -66.413
                                                                1.838
                       -75.136
                                           -59.740 -184.356
                                                              35.293 -21.457 -40.347
                                                                                         31.191
                                   22.372
                                 271.859 -435.568 -1080.690
                                                              111.003 -17.317 -302.969 225.222
   .00 30.00 -2372.275 -255.725
                                  82.782 -372.150 -1077.115
                                                               84.062
                                                                        42.975 -505.530
                                                                                        362,229
   .00 40.01 -3424.759 -255.961
                                                               57.280 -43.838 -567.125
                                                                                         80.701
                        -34.839
                                  -72.670 -240.753 -441.104
   .00 50.00 -584.645
                                                                        9.474 -321.682 -27.680
              735.500
                         34.866 -257.312
                                            33.931
                                                     179.685
                                                               39.390
   .00 60.01
                                                                       -15.137 -279.047 -98.514
                                           83.900
              926.892
                       156.672 -298.232
                                                     300.507
                                                               22.463
   .00 70.00
                                                               32.352
                                                                        -2.082 -34.209
                                                                                         14.190
   .00 80.00
              405.467
                         43.339
                                 -64.024
                                             -.060
                                                     138.876
                                 -32.551
                                                              -19.290 -22.307 -38.885
                                            -3.266
                                                     98.791
                                                                                         15.245
   .00 90.00
               219.090
                         51.235
   .00 100.00
                                                     66.380
                                                              -23.160
                                                                        -1.171 -52.330
                                                                                         -3.251
              122.708
                         9.264
                                 -10.592
                                           16.593
                         1.838
                                           30.987
                                                     22.578
                                                               -9.707
                                                                        4.413 -39.521 -31.580
                                 -14.223
   .00 110.00
               39.755
                                                                        -2.461 -39.861 -18.141
                                 -27.493
   .00 120.00
                10.716
                          3.987
                                            -2.284
                                                     11.334
                                                               -7.567
                                 -13.017
                                           18.005
                                                      4.127
                                                               2.351
                                                                        1.216 -17.454 -17.089
                         14.961
   .00 130.00
                35.163
                         7.401
                                                                         -.001 -10.957
                                                                                           . 899
              -13.689
                                 -5.756
                                             -.666
                                                    2.515
                                                               1.662
   .00 140.00
                                                     3.852
                           .077
                                                                        -1.904 -13.581
   .00 150.01
              -14.053
                                   3.621
                                             1.364
                                                                 .990
                                                                                         -2.605
                                 11.550
                                                               1.384
                                                                                -5.086
                                                                                         -9.912
                                                                        5.418
   .00 160.00
                11.102
                          1.254
                                             2.003
                                                       1.245
                                                               6.549
                                                                         2.424
                                                                                -2.985
                                                                                         -5.068
   .00 170.01
                30.958
                          7.538
                                   25.172
                                             5.765
                                                     5.367
                                                                        -1.283 -10.169
                           .445
                                                     1.862
                                                               -1.034
                                                                                         -7.494
   .00 180.00
                 3.659
                                   10.637
                                            -2.078
                                              .151
                           -.692
                                   8.668
                                                       2.808
                                                               1.762
                                                                         .044 -6.661
                                                                                         -1.660
   .00 190.01
                 6.798
                           .934
                                                                -1.709
                                                                         -.296
                                                                                -7.326
                                                                                          .542
                 4.588
                                   15.714
                                             2.265
                                                      -1.008
   .00 200.01
                                                                                -2.803
                           .331
                                   19.360
                                              .644
                                                     2.296
                                                                .939
                                                                         .638
                                                                                         -1.357
   .00 224.99
                 6.114
C H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=1.5 mm
C D062394
C 10 : No. of data points
С
Су
            T SIGt'
        х
  4.5 1.5 1456 91
 5.0
       1.5 1645 193
       1.5 1603 483
 5.5
  5.75 1.5 1389 624
  6.0
       1.5 1123 654
  6.25 1.5 937 633
 6.5
       1.5 691 525
 7.0
       1.5 450 313
 7.6
            329 74
       1.5
 8.8
       1.5
            315 41
C FILENAME= H904A010.T
C H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=10 mm
C D062394
   8 : No. of data points
С
            T SIGt'
 У
        х
 6.0
       10 1615 146
       10 1716 171
 6.5
       10 1827 253
 7.0
          1776 403
       10
 8.2
           1525 617
 8.8
       10
 9.6
       10
            959 650
 10.4
       10
            623 471
       10
            400 221
 11.2
C FILENAME= H904A025.T
C H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=25 mm
C 13 : No. of data points
             T SIGt'
Су
        х
 8.2 25 1580 116
       25 1595 114
25 1633 141
 8.8
 9.6
       25 1677 150
 10.4
       25 1761 209
 11.2
 12.0
       25
           1776 364
       25 1654 558
 12.8
 13.4
       25 1460 641
       25 1618 480
 14.0
 14.7
       25
            814 618
```

-6.330

```
15.5
       25
             598 473
 16.5
        25
             407 235
 17.7
        25
             340 88
C FILENAME= H904A050.T
C H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=50 mm
C D062394
C 16 : No. of data points
Су
              T SIGt'
         x
  9.6
        50 1528 349
 10.4
        50
            1664 223
        50 1546 425
 11.2
 12.0
        50 1485 480
 12.8
        50 1670 305
 13.4
        50
            1615 340
 14.0
        50 1365 595
 14.7
        50 1631 369
 15.5
        50 1446 578
 16.5
        50
           1083 641
 17.7
            902 625
        50
 19.0
        50
             778 560
 20.5
        50
             587 440
 22.0
        50
             532 378
 23.5
        50
             443 282
 25.0
        50
            388 180
C FILENAME= H904A075.T
С
  H2 FLAME; d=9.45, d=10.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=75 mm
С
  D062394
C 19 : No. of data points
С
        х
             T SIGt'
  8.8
       75 1573 279
 9.6
       75 1604 295
 10.4
        75
           1605 294
 11.2
       75 1578 334
 12.0
       75 1583 407
 12.8
       75
           1534 420
 13.4
       75
            1482 469
 14.0
       75
           1418 521
       75
 14.7
          1376 530
 15.5
       75
           1309 536
       75 1277 567
 16.5
 17.7
       75 1191 566
 19.0
       75
           1421 390
 20.5
       75
           1012 559
 22.0
       75
            884 543
       75
 23.5
            762 495
 25.0
       75
            669 439
 26.5
       75
            553 350
28.0
       75
            535 331
C FILENAME= H904A150.T
C H2 FLAME; d=9.45, d=10.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=150 mm
C D062394
C 15 : No. of data points
С
Су
             T SIGt'
        x
 0.0
      150 1604 98
 1.3
       150 1619 104
       150 1635 117
 2.7
 4.5
       150 1637 119
 6.0
       150 1637 137
 7.6
       150 1646 152
 9.6
       150 1630 218
11.2
       150 1650 185
13.4
       150 1659 214
```

```
150 1606 373
 14.7
         150 1719 269
 16.5
        150 1661 309
 19.0
        150 1420 557
 22.0
       150 1166 594
150 1005 555
 25.0
 28.0
C FILENAME= H904A225.T
С
C H2 FLAME; d=9.45, delta=0.2 mm; theta=45 deg.; Uj=100, Ua=20, Ue=4 m/s; x=225 mm
C D062394
C 15 : No. of data points
C y x 1 2 2 1 6 2 9 1 2 1 2 2 5 1 6 3 6 1 7 7
         x T SIGt'
         225 1669 116
  2.7
  4.5
         225 1680 130
        225 1664 127
225 1666 122
  6.0
  7.6
  9.6
        225 1669 166
         225 1694 210
 12.0
 13.4
         225 1692 181
         225 1676 316
 14.7
         225 1690 270
 16.5
         225 1681 376
225 1559 468
 19.0
 22.0
 25.0
       225 1420 548
 28.0 225 1257 539
```